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DISEASES DUE TO PROTOZOAN PARASITES.

YAKIMOFF (W. L.) & WOÏZEKHOWSKY (A. M.). La résistance des érythrocytes au cours de la babesiellose bovine. [**The Resistance of the Red Blood Corpuscles in Bovine Babesiellosis.**]—*Bull. Soc. Path. Exot.* 1926. July. Vol. 19. No. 7. pp. 548–549.

The author has tested the fragility of the red corpuscles by mixing with citrated blood solutions of salt of different concentrations. The concentrations ranged from 1 per cent. to 0·3 per cent., with intervals of ·02 per cent.

Samples of blood from normal cows were first tested, and it was found that haemolysis began on an average in tubes containing ·7 per cent. salt and that it was complete in tubes containing ·43 (average) per cent.

Samples of blood from 11 animals infected with *Babesiella bovis* were tested in the same way. The concentration in which haemolysis began ranged in these from 1 per cent. down to ·76 per cent. and the concentrations in which it was complete varied from ·56 per cent. to ·40 per cent. The authors conclude that this is evidence of an increased fragility.

YAKIMOFF (W. L.), MARKOFF-PETRASCHEWSKY (E. N.) & LOUKIANOFF (W. A.). A propos de l'immunisation des bovidés vis-à-vis de *Babesiella bovis* en Russie. [**Immunization against** *Babesiella bovis* **in Russia.**]—*Bull. Soc. Path. Exot.* 1926. July. Vol. 19. No. 7. pp. 550–554.

The authors give details of six cases in which a dose of blood containing the parasite was followed by injection of trypanblue when the parasites made their appearance in the circulation.

The experiments are also described in which a dose of trypanblue was given first and was followed at intervals ranging from 20 to 53 days by a dose of infective blood. All three animals became infected, but recovered. No controls to show the action of the infected blood alone are mentioned.

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YAKIMOFF (W. L.), MARKOFF-PETRASCHEWSKY (E. N.), GNÉDINE (A. N.), RASTÉGAIEFF (E. F.), ROUMIANZEFF (E. W.) & TURIKOFF (M. F.). L'arrhénal dans le traitement de la babesiellose bovine. (Note préliminaire.) [**The Treatment of Bovine Babesiellosis with Arrhenal. Preliminary Note.**]—*Bull. Soc. Path. Exot.* 1926. July. Vol. 19. No. 7. pp. 554–557.

The authors found the dose recommended by PIOT-BEY (5 cc. of a 10 per cent. solution) insufficient, and used in succession 1 and 2 grammes of the drug, but without success.

They state that for subcutaneous injection the dose must be 2·5 to 3 grammes, and for intravenous injection at least 1·5 grammes.

One hundred and thirty-six animals were treated by subcutaneous injection with a mortality of 8·8 per cent.

Sixty-seven were treated by intravenous injection with a mortality of 7·4 per cent.

YAKIMOFF (W. L.) and others. **Piroplasmosis (Babesiellosis, Red Water) of the Cattle in the North-West of Russia.**—*Cent. f. Bakt.* I. Abt. Orig. 1926. Oct. 30. Vol. 100. No. 4-6. pp. 224–258.

Piroplasmosis occurs throughout the greater part of Russia, only the extreme north and the north-east being free. The first portion of the paper, which is divided into ten sections, deals with the spread of the disease, and gives statistical figures of the incidence and mortality. The symptoms and lesions are dealt with, but the description does not add to our knowledge. The transmitting tick is *Ixodes ricinus*. Rupture of the spleen is known to occur, but this does not happen frequently. No evidence of the existence of anaplasmosis has been obtained.

DONATIEN (A.) & LESTOQUARD (F.). Transmission expérimentale de *Piroplasma caballi* à l'âne. [**The Experimental Infection of the Donkey with** *P. caballi*.]—*Bull. Soc. Path. Exot.* 1926. July. Vol. 19. No. 7. pp. 546–547.

The authors infected a donkey foal 8 days old with blood containing *Piroplasma caballi*. A 10-year-old native horse inoculated at the same time failed to become infected. An attempt was made to infect the foal's dam and an imported horse from the foal, but without success, owing it is held to their having been "premunised" by a natural infection at an earlier date.

YAKIMOFF (W. L.). L'hématurie au cours des épizooties de piroplasmose. [**Haematuria in the Course of Epizootics of Piroplasmosis.**]—*Bull. Soc. Path. Exot.* 1926. Oct. Vol. 19. No. 8. pp. 686–688.

The author states that during the period 1923–1925, when he was in North-Western Russia supervising a campaign against piroplasmosis (babesiellosis) of cattle, he encountered no case of "haematuria." During 1926 his collaborators have seen three cases, but in these cases no piroplasms were found in the blood.

RAU (M. A. N.). **Experimental Infection of the Jackal** (*Canis aureus*) **with** *Piroplasma canis*, **Prana and Galli-Valerio, 1895. A Preliminary Note.**—*Indian Jl. Med. Res.* 1926. July. Vol. 14. No. 1. pp. 243–244.

A jackal cub which had been under observation for a month was given 5 cc. of blood from a dog harbouring *P. canis*. On the next day but one a second dose was given. Both inoculations were by the intravenous path. On the day following the second dose of blood smears showed parasites to be fairly numerous. The number very rapidly declined during the next two days. For nine days no parasites were found, but they reappeared in fairly large numbers and persisted for a fortnight. In a second jackal inoculated from the first parasites appeared on the second day and were discoverable for ten days.

THEILER (A.) & DU TOIT (P. J.). La transmission des maladies, dont les tiques sont les vecteurs, par l'injection intrajugulaire d'une émulsion de l'hôte intermédiaire. [**The Transmission of Tick-conveyed Diseases by the Intravenous Injection of an Emulsion of the Intermediate Host.**]—*Bull. Soc. Path. Exot.* 1926. Oct. Vol. 19. No. 8. pp. 725–737.

Heartwater.—Whereas Rocky Mountain fever is transmitted by a three-host tick, which can pass on the infection from any one stage to the next, including adult to larva through the egg, heartwater infection, although handed on from the immature stages to adults, is apparently not transmissible by larvae which are the progeny of infected adult ticks.

In experiments it was found that nymphs of *Amblyomma hebraeum*, both fed and starved, infected with heartwater could be used to transmit the infection by the intravenous inoculation of an emulsion of their bodies. The infection produced by starved ticks was less severe then that produced by engorged ticks, but in no case was the disease fatal. In some cases inoculation with starved ticks failed, and in these instances no immunity was produced.

Similar experiments were carried out with East Coast fever using *R. appendiculatus*. The transmitting ticks of this disease are three host ticks. The ticks acquire infection during their immature phases, but the infection is not passed through the egg, nor is the infection of a larva passed on to the adult if the nymphal stage is passed on a non-infected animal. In the experiments described the fact was not lost sight of that infected nymphs and adults only transmit the infection between 72 and 120 hours after attachment.

In experimental tests it was found that unengorged adults failed to transmit East Coast fever when an emulsion of them was inoculated intravenously. Adults which had fed for 72 hours when so injected caused a mild attack of the disease. Adults fed for 90 hours produced the disease in the two experiments carried out.

In experiments carried out with nymphs it was found that neither engorged nor unengorged were they capable of transmitting East Coast fever by intrajugular inoculation of an emulsion. Nymphs fed for 90 hours produced an infection and established immunity, but in two cases immunity was not conferred by this means.

BROUDIN & PEYTAVIN, with NGUYÊN-VAN-DÊN, KIÊU-THIÊN-THÊ & NGUYÊN-TRUNG-TRUYÊN. Contribution à l'étude du surra d'Indochine. [**Surra in Indochina.**]—*Bull. Soc. Path. Exot.* 1926. Oct. Vol. 19. No. 8. pp. 746–761. With 7 charts in text.

The authors deal in this paper with the following subjects: (1) History, distribution and species affected; (2) diagnosis in the ox; (3) clinical notes; (4) lesions; (5) test inoculations with small animals; (6) epizootics; (7) transmitting agents; (8) carriers; (9) treatment; (10) laboratory studies.

It is noted that no mortality due to surra is ever encountered in the buffalo in Indochina, while in oxen the disease is sometimes very serious. Buffaloes however, are of extreme importance as reservoirs.

NIESCHULZ (O.). Zoologische Bijdragen tot het Surraprobleem. IV. Over de ontwikkeling van *Tabanus striatus* Fabr. [**Contributions to the Surra Problem. IV. The Development of *Tabanus striatus* Fabr.**]—*Nederl.-Indië Bladen v. Diergeneesk.* 1926. Aug. Vol. 38. No. 4. pp. 327–347. With 3 text figs. & 2 plates.

The following is abstracted from the author's German summary of his paper.

Tabanus striatus is one of the most widely spread Tabanidae in the Indian Archipelago, and plays a great part in the transmission of surra.

The egg-packets measure from 6·5 to 11 mm. long, 3·25–5 mm. wide and 1·5–2·25 mm. thick, and contain on an average some 300 eggs. The packets are flatter than those of *T. rubidus*.

The period of incubation is 4–5 days.

The fly passes through seven larval stages which can be divided into three groups. During the first stage which is very brief the larva does not eat. The second to the sixth stages each occupy from two to ten days, and during this period the larvae eat regularly. The seventh stage lasts from 14 to 159 days. During the earlier part of this phase the larvae eat freely, but later they enter a period of complete quiescence.

The larvae of *T. striatus* are smaller than those of *T. rubidus* and measure 26·5–30·8 mm. (*T. rubidus*, 34·5–42·4 mm.)

The pupal stage lasts from 8 to 12 days. The pupa may be distinguished from that of *T. rubidus* by the fact that the hindermost dorsal pair of tubercles on the head are not larger than the ventral and ventrolateral pair, whereas in *T. rubidus* they are. The males and females occur in approximately equal numbers, but during the observations in the laboratory it was found that in the pupal stage far more females than males died. The pupal period of the males is generally shorter by a few days than that of the females.

DIOS (R. L.) & ZUCCARINI (J. A.). Primera comprobación de Tripanosomosis bovina en la R. Argentina. [**The Detection of Bovine Trypanosomiasis in the Argentine.**]—*Revist. Inst. Bact. Dept. Nac. Hyg.* 1925. Mar. Vol. 4. No. 1. pp. 80–84. With 1 coloured plate.

The authors figure and describe a trypanosome detected in the blood of a bovine infected with redwater (*B. bigeminum*).

They failed to transmit the infection by inoculation, and attempts to cultivate the trypanosome did not succeed.

On morphological grounds they indentify the parasite as *T. theileri*.

VAN DEN BRANDEN (F.). L'action du Naganol "Bayer 205 Vétérinaire" sur les infections à *Trypanosoma congolense* et à *Trypanosoma dimorphon*. [**The Action of Veterinary "Bayer 205" (Naganol) on** *Congolense* **and** *Dimorphon* **Infections.**]—*Ann. Soc. Belge. Méd. Trop.* 1926. July. Vol. 6. No. 2. pp. 207–212.

The authors have tested naganol and tryparsamide on guineapigs inoculated with blood containing *T. congolense* and *T. dimorphon*.

Naganol was injected subcutaneously at the rate of 1 g. per 25 kilos, the doses ranging actually from 12 to 14 mg. Six guineapigs were treated and all were cured, the period of examination of the blood continuing for 2 months.

In the experiments with tryparsamide the dose was 3 g. per 50 kilos, and ranged from 27 mg. to 40 mg. for the different guineapigs. Under this treatment *T. dimorphon* disappeared while *T. congolense* persisted. Three of the guineapigs died of *congolense* infection.

Of 6 pigs naturally infected with the 2 trypanosomes 5 recovered and 1 died when treated with tryparosan. Three were treated with naganol, and all recovered. Brief details of the latter cases are as follows: Pig 1. Weighing 40 kilos, was given 1 g. of naganol in 10 cc. of distilled water subcutaneously. The blood was examined daily with negative results for a week, when a second dose of 0·5 g. was given.

Pig 2. Weight, 50 kilos. This animal received similar treatment, but trypanosomes persisted in small numbers in the blood after the first injection. The second was given a fortnight after the first.

Pig 3. This animal weighed only 30 kilos and was given 0·5 g. in 5 cc. subcutaneously. The circulation was cleared and the dose was repeated after a fortnight.

A number of zebus and native Dahomey cattle which showed either the mixed infection or the pure *congolense* infection were put under treatment.

The experiments with zebus indicated that while a cure of *congolense* infection can be achieved, failures resulted with the *T. dimorphon* infection.

The drugs used were copper sulpharsenol, tartar emetic and naganol. The following illustrates the way in which the treatment was administered. A cow weighing 250 kilos was given 0·3 g. of copper sulpharsenol subcutaneously. Two days later 0·2 g. of tartar emetic was administered intravenously and 3 and 7 days later 5 g. of naganol were given subcutaneously. *T. dimorphon* persisted and the animal died showing posterior paralysis. A similar course of treatment cured a pure *congolense* infection.

Native animals treated with 3 doses of naganol ranging from 1·5 to 2 g. with 2 or 3 day intervals recovered when their infection was a pure *congolense* one, but died when the double infection was present.

DIOS (Roberto L.). Ensayos de tratamiento preventivo y curativo con " Bayer 205." [**Preventive and Curative Treatment with " Bayer 205."**]—*Revist. Inst. Bact. Dept. Nac. Hyg.* Buenos Aires. 1925. Mar. Vol. 4. No. 1. pp. 51–56.

A horse experimentally infected with Mal de Caderas received a total of 17 grammes of " Bayer 205 " intravenously in the course of about 4 months. It is not specifically stated what was the dose in each case, but the first two were of 4 grammes each. The trypanosomes disappeared for periods ranging from 4 to 31 days between the doses, but the animal finally died of the disease. The failure to effect a cure is attributed by the authors to too long intervals having been allowed to elapse between the doses.

In a second experiment a horse was given an intravenous injection of 4 grammes of the drug in 60 cc. of salt solution and this was followed by an inoculation with 70 cc. of blood containing a very virulent strain of trypanosomes. Infection failed to occur.

A dog which was infected with the trypanosome from a horse was cured (period of observation 1 year 11 months) by a single injection of " 0·50 centigrammes." At the end of the period of observation the dog was successfully re-infected and was cured (4 months observation) by a dose of " 0·60 centigrammes." The protective power of the drug for dogs was shown by injecting two dogs with 1·24 g. and 0·48 g., and later inoculating them along with two controls with the trypanosome. Both the treated dogs resisted infection and the controls died.

DIOS (R. L.) & ZUCCARINI (J. A.). Action préventive du Bayer 205 sur l'inoculation du " Mal de Caderas " au cobaye. [**The Protective Action of " Bayer 205 " upon the Inoculation of Guineapigs with Mal de Caderas.**]—*Compt. Rend. Soc. Biol.* 1926. Sept. 21. Vol. 95. No. 27. p. 828.

Series of guineapigs were given injections of " Bayer 205 " in increasing amounts and were tested at progressively longer intervals. [The exact significance of the results cannot be stated since owing to a misprint one or more lines appear to be missing from the text.] It would appear that 9 mg. protected against infection practised 45 days later and progressively 200 mg. protected against inoculation 100 days later.

LEDENTU (G.) & DAUDE (J.). Contribution à l'étude du produit " 309 " dans la trypanosomiase des bovidés. Action préventive et action curative. [**The Protective and Curative Actions of " 309 " in Bovine Trypanosomiasis.**]—*Bull. Soc. Path. Exot.* 1926. July. Vol. 19. No. 7. pp. 614–620.

After experiments had been carried out upon guineapigs it was decided to carry out a large scale test with cattle, and for this purpose a mob of cattle travelling from Tchad to Brazzaville was used.

Half the herd was to be kept as control and the other was to be given 10 grammes per head at Fort Archambault—the starting point—and two other injections of 5 grammes at intervals of a month. This

was an average of 0·07 centigrammes per kilogramme body weight. The drug was given intravenously into the ear vein in 20 per cent. solution. Of 61 animals collected at Melfi, 32 became infected with baléri on the way to Fort Archambault. This point is interesting, as it shows the virulence of the epizootic along the banks of the Chari during November. This journey occupied a month.

It is not improbable that some of the animals thought to be healthy when they were dispatched from Fort Archambault were actually infected.

Twenty-seven apparently healthy animals were sent off, and of these 16 were given two of the doses of "309." On arrival at Bangui six weeks later there were 25 survivors, 15 injected and 10 controls. Of these about one-third of each batch were found to be infected. Prior to despatch from Bangui the third dose of "309" was given and 7 injected and 5 controls were sent on. A month later 5 injected and 4 controls reached Brazzaville. Examination showed that only one animal—a control—had escaped infection.

Seven of these animals were subjected to curative treatment with the drug. Five of these had already received 20 g. for protective purposes, and the other two were controls. The injections were given intravenously in 25 per cent. solution.

In the controls a single dose of 10 g. caused a disappearance of the trypanosomes for four days. After three doses of 10 g. each trypanosomes made a brief appearance in the circulation 15 days after the third dose.

In the animals previously treated a single dose of 10 g. caused sterilization, which lasted 6 days. After a single dose of 15 g. relapse occurred on the 4th day, and after two doses of 10 g. relapse occurred after 18 days.

The necessity of slaughtering the animals prevented the prolongation of the experiment. In the course of the tests it was noted that the drug is without action upon microfilariasis.

LEDENTU (G.). Note complémentaire sur l'action curative du 309 Fourneau dans la trypanosomiase bovine. [**Additional Note on the Curative Effect of Fourneau 309 in Bovine Trypanosomiasis.**]—*Bull. Soc. Path. Exot.* 1926. Oct. Vol. 19. No. 8. pp. 692–693.

A single animal was used to test the extent to which the drug could be pushed. The beast had already had two courses of treatment, each comprising 20 grammes. Doses of 10, 5 and 5 g. had been given at intervals of a month to test the protective power of the drug. Infection with *T. congolense* occurred. As an attempt at curative treatment two doses of 10 g. had been given at an interval of 4 days, but relapse occurred on the 18th day. Six intravenous injections were given at intervals of 5 days, each dose being 10 grammes. The first four doses appeared to be well tolerated, and the animal improved somewhat in condition, but with the last two doses there was marked loss of condition, and the animal died about a month after the last dose in a condition of extreme cachexia.

Trypanosomes were apparently absent from the circulation during this period.

VAN DEN BRANDEN (F.). Le "Heyden 661" ou antimosan dans le traitement de la trypanosomiase humaine. [**Heyden 661 or Antimosan in the Treatment of Human Trypanosomiasis.**]—*Bull. Soc. Path. Exot.* 1926. Oct. Vol. 19. No. 8. pp. 688–691.

Antimosan is less trypanocidal in action than tartar emetic, and its action is temporary. It has however the advantage that it can be administered subcutaneously or intramuscularly.

Chronic cases rapidly lost condition under treatment.

EDWARDS (J. T.). **The Chemotherapy of Surra** (*Trypanosoma evansi* **Infections) of Horses and Cattle in India.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1926. Mar. 18 & May 20. Vol. 20. Nos. 1 & 2. pp. 10–71. With 1 diagram, 12 charts & 2 figs. on 1 plate.

The author details experiments carried out with "Bayer 205," tryparsamide, tartar emetic, bismuth phosphate, and bismuth sodium tartrate.

In the earlier experiments bovines were used, but subsequently experiments were carried out on horses. In the latter the average period of incubation was 5–6 days.

"Bayer 205" was used for prophylactic treatment of horses in doses ranging from 1 to 10 g. per 1,000 lb. body weight. Details of 6 such animals are given, and from these it may be gathered that while a dose at the rate of 7·5 g. protected up to 22 days, a dose at the rate of 10 g. failed to protect at 2 months. It is suggested that for horses working in surra areas the treatment should be "Bayer 205" intravenously at the rate of 1 g. per 1,000 lb. once a fortnight. In the course of experiments with tartar emetic it was found that horses and cattle can stand approximately the same dosages by intravenous injection, i.e., about 5 cc. of M-10 solution per 100 lb. body weight.

This drug remains in trypanocidal concentration in the blood for about 24 hours only. Hence the necessity for repeated injections. Tartar emetic appears to exert a direct toxic effect upon trypanosomes, and when given to an animal having trypanosomes in its blood may cause sudden death.

In experiments to test the prophylactic action of tartar emetic it was found that only 2 out of 7 were protected. These animals had one or more doses of 10 cc. of 3 per cent. solution (nearly M/10), the last of which was not more than a day before test inoculation. Where the interval was three days relapse occurred.

Bismuth compounds yielded results somewhat similar to those given by antimony, but they were generally less efficacious.

Tryparsamide yielded poor results. Its action as a prophylactic was similar to that of tartar emetic, but even less pronounced. Rapid excretion appears to explain the inability of the drug to produce more than a brief sterilization.

The author gives an account of the technique for withdrawing cerebro-spinal fluid from horses during life.

FERNANDEZ (N. F.). Formalinbehandlung der Surra. [**Formalin Treatment of Surra.**]—*Berlin. Tierärzt. Woch.* 1926. Oct. 15. Vol. 42. No. 42. p. 707.

The author treated three camels suffering from surra with formalin by intravenous injection. Doses of 20 cc. were given on alternate

days until 13 doses had been given, then doses were given at three-day intervals. The treatment lasted 1½ months. On the days when no injection was given 2 drams of liquor arsenicalis were given by the mouth.

During treatment the animals improved rapidly in condition and no trypanosomes were found in the blood. The camels were put to work and three months later were apparently quite healthy. The author claims to have had strikingly successful results in the treatment of distemper, strangles, mastitis in cows, haemorrhagic septicaemia, and rinderpest with intravenous injections of formalin. He has also used it in cases of epizootic lymphangitis, farcy, and microfilariasis. He claims good results in the first of these.

The dilution used was ½ to 1 ounces per pint, and for horses, cattle and camels the dose was 20 cc.

Dogs received 1 to 3 cc. of a dilution containing ½ to ¾ of a dram in 5 ounces of distilled water.

LEVADITI (C.), NICOLAU (S.) & GALLOWAY (I.) Essais de prophylaxie des trypanosomiases par des dérivés phényl-arsiniques administrés *per os*. [**Phenylarsenic Compounds given per os as Prophylactics against Trypanosomiasis.**]—*Bull. Soc. Path. Exot.* 1926. Oct. Vol. 19. No. 8. pp. 737–746.

Tryparsamide and " 270 " Fourneau protected rabbits against subcorneal or conjunctival inoculation with the nagana trypanosome. Stovarsol and " 192 " Fourneau were less effective. The dose of the former was 0·1 g. per kilog. administered 24 hours to 3 days before infection. In infected rabbits 6 doses of 0·02 g. per kilog. of the drug given at intervals of a day or two caused the keratitis to clear up.

" 270 " was used in 0·1 g. per kilogramme doses, and was effective if the period between dosing and inoculation did not exceed 48 hours. But the prevention of local lesions did not always correspond with general sterilization.

It is noted that the doses used approximate to the maximum medicinal dose, for in some cases it appeared that poisoning resulted.

KEEVILL (Arthur). **The Treatment of Sleeping Sickness** (*Trypanosoma rhodesiense*)—**a Study of Fifty Cases.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1926. Mar. 18 & May 20. Vol. 20. Nos. 1 & 2. pp. 111–118.

Tryparsamide was found to fail to sterilize neither the blood nor the spinal fluid. With " Bayer 205 " there was sterilization of the blood and spinal fluid, and immediate improvement as a rule. Tryparsamide should be used in cases relapsing after " Bayer 205," but three months should elapse before it is applied, as otherwise the risk of visual disturbance or blindness is greatly increased.

The immediate results of the drug " 309 " (Fourneau, Tréfouel & Vallée) are at least as good as those of " Bayer 205."

DYE (William H.). **The Serum-Formalin Reaction in** *Trypanosoma rhodesiense* **Infection.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1926. Mar. 18 & May 20. Vol. 20. Nos. 1 & 2. pp. 74–92. With 2 figs.

The author gives an account of an outbreak of *rhodesiense* infection and details the results obtained with various methods of treatment.

With regard to the serum-formalin reaction the following conclusions are drawn :—

1. The reaction is accelerated by rendering the serum hypertonic with sodium chloride, but this does not cause a normal serum to give the reaction.

If a small quantity of " Bayer 205 " ($\frac{1}{4}$ grain) be left in contact with the serum for an hour before the formalin is added there is a marked retardation of the phenomenon. Tryparsamide did not cause this retardation unless the drug were added in the proportion of at least 1 grain per cc. The cerebrospinal fluid does not give the reaction even if taken just before death.

The reaction is to some extent disappointing, but a negative result in an untreated case is of value. In the case of a positive result in an untreated person the value of the result can be decided by three injections of " Bayer 205," for if the case be not one of trypanosomiasis there will be no alteration in the reaction.

THIROUX (A.) Au sujet de la prophylaxie de la maladie du sommeil. [**Prophylaxis in Sleeping Sickness.**]—*Bull. Soc. Path. Exot.* 1926. Oct. Vol. 19. No. 8. pp. 701–702.

In this short note it is suggested that oil of cajeput might serve as a repellent to biting flies.

SCHERN (Kurt). Ueber die auf grund des Zuckerphänomens der Trypanosomen geklärte Pathogenese der Trypanosomosen. [**The Pathogeny of Trypanosomiasis explained upon the basis of Trypanosome Sugar Phenomena.**]—*Berlin. Tierärzt. Woch.* 1926. Oct. 1. Vol. 42. No. 40. pp. 665–666.

In this short note the author expresses the view that trypanosomiasis brings about a condition of hypoglycaemia. This causes disturbance of liver function and " sugar hunger." Finally a general intoxication with coma results from the derangement of the physiological action of the liver. No experimental details are given.

MAZZA (S.). Infection spontanée du chien par le *Schizotrypanum cruzi*. [**Spontaneous Infection of a Dog with** *Schizotrypanum cruzi*.]—*Compt. Rend. Soc. Biol.* 1926. Sept. 21. Vol. 95. No. 27. pp. 809–811.

The author records the occurrence of a natural infection in the dog with *Schizotrypanum cruzi*. Guineapigs and mice were inoculated from it, but in only one mouse did infection occur. *Amblyomma cajennse* and *A. variegatum* were found on the dog. No flagellates were found in these.

BOECK (W. C.) & TANABE (M.). *Chilomastix gallinarum*, **Morphology, Division and Cultivation.**—*Amer. Jl. Hyg.* 1926. May. Vol. 6. No. 3. pp. 319–336. With 2 plates & 1 text fig.

The authors give a detailed account of *Chilomastix gallinarum* which occurs in the caeca of turkeys and fowls, its mode of division and cultural methods.

They found that parasites of turkeys could be transferred by injection of either motile or encysted forms to chickens, and vice versa.

The parasite is not a Tetrachilomastix as described by FONSECA. There are only three anterior flagella, but there is a cytostomal flagellum. The nucleus is vesicular and anteriorly placed, and there are four blepharoplasts and a centrosome.

The right lip of the cytostome is supported by the right fibre and the peristomal fibre and the left by the left fibre which supports the undulating membrane and this carries the cytostomal flagellum along its margin.

The anterior pair of blepharoplasts give rise to the anterior flagella, and the posterior pair to the right and left fibres of the cytostome and to the cytostomal flagellum.

Division is by binary fission. The blepharoplasts divide and the new flagella form as outgrowths from the daughter blepharoplasts.

Cultures were obtained in Locke's solution 8 parts and human serum 1 part, and in egg medium covered with the same mixture (L. E. S. medium).

HINDLE (E.) HOU (P. C.) & PATTON (W. S.). **Serological Studies on Chinese Kala Azar.**—*Proc. Roy. Soc.* 1926. Oct. 1. Ser. B. Vol. 100. No. B 704. pp. 368–373.

Whereas in the case of the Indian type of leishmaniasis normal human serum is found to have an inimical effect upon cultures of the flagellate, the results obtained in similar tests with Chinese strains were very variable. Some of the sera from both normal and Leishmania-infected people destroyed the parasites; other did not. In each case about 60 per cent. of the sera were effective and 40 per cent. ineffective. Similar inconstant results were obtained with the blood of normal and infected hamsters and with the blood of the dog, sheep, rabbit and guineapig. By increasing the proportion of serum to culture a greater number of the parasites could be immobilized. Heating the serum to 55° C for half an hour destroyed the power.

These results would appear to suggest that the body cannot be invaded by the flagellate forms, as these would be destroyed by the serum.

The " destruction " of parasites is probably, however, more apparent than real. Certainly the majority of the parasites are immobilized when mixed with serum, and many are dissolved.

By staining such preparations the authors have frequently been able to find parasites with no obvious signs of degeneration, and culture experiments indicate that the parasites are not completely destroyed by the serum. Conclusive evidence that the flagellate stage can produce infection is shewn by the successful inoculation of hamsters. It would appear, then, that some of the parasites in culture can resist the action of serum. No morphological differences have been made out.

In infection experiments capillary tubes containing cultures were placed under the skin and in the peritoneum and examined at intervals. Large numbers of phagocytes were found in the tubes and the parasites had disappeared. No appearance of development could be detected in any of the organisms ingested by the leucocytes.

Experiments appeared to indicate that there was no special increase in the complemental power of the serum of kala azar patients.

Using spleen emulsion of infected hamsters as antigen, the authors found that the complement fixation test gave comparatively good results. Of 24 cases diagnosed by liver puncture, 19 gave definitely positive complement fixation tests, and there was a partial reaction in the remaining five.

To test the specific nature of the reaction the blood of 54 patients suffering from other diseases was tested. In 44 there was complete haemolysis and in 4 incomplete haemolysis. Six gave definite reactions. Five of these were syphilitics and the other serum was definitely anti-complementary.

The blood of three patients successfully treated with tartar emetic gave negative results.

HINDLE (E.) & PATTON (W. S.). **Experiments bearing on the Susceptibility of the Striped Hamster** (*Cricetulus griseus*) **to Leishmania of Chinese Kala Azar.**—*Proc. Roy. Soc.* 1926. Oct. 1. Ser. B. Vol. 100. No. B 704. pp. 374–379.

The rodent is markedly susceptible to infection by intraperitoneal inoculation, using both flagellate and non-flagellate stages. When only small numbers of parasites are contained in the inoculum, the resulting infection may be very slight and may be missed. There is commonly no enlargement of the spleen even when large numbers are given. If a heavy inoculation is given, there may be great enlargement of the spleen, and in such cases the parasite can be recovered from the blood.

PATTON (W. S.) & HINDLE (E.). **Notes on Kala Azar in Shantung.**—*Proc. Roy. Soc.* 1926. Oct. 1. Ser. B. Vol. 100. No. B 704. pp. 379–384. With 1 text fig.

The disease is probably more common in males than females, and is most prevalent during the first decade of life. From this time onwards the incidence declines until it is very rare after 40 years of age. An analysis of three hundred cases suggests that there is no special seasonal incidence as judged by admissions to hospital.

In China it would appear that the mean duration of the disease is from 1 to 2 years, whereas the figures for Assam indicate a duration there of about half this. In some cases histories of infection for periods of 15 years have been obtained.

Seventy-five per cent. of the cases occur among villagers as distinct from townsmen, and among neighbouring villages the incidence is uneven.

The period of incubation is long, running into many months at least.

HINDLE (E.) & PATTON (W. S.). **Resistance of Leishmania Cultures to Cold.**—*Proc. Roy. Soc.* 1926. Oct. 1. Ser. B. Vol. 100. No. B 704. pp. 385–386.

Observations on hibernating insects showed that the natural flagellates of these insects are not affected by cold. Experiments with cultures in Wenyon's NNN medium revealed the fact that they are able to withstand intermittent exposures to temperatures of –12° C (exposure out of doors at night) for a period of at least 10 days. The flagellate

stage is able to survive freezing solid, for within an hour of being thawed active organisms could be found. In view of these facts it is reasonable to assume that it can survive in hibernating insects through the winter.

SMYLY (H. Jocelyn). **Chemotherapy of Experimental Leishmaniasis in Hamsters.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1926. Mar. 18 & May 20. Vol. 20. Nos. 1 & 2. pp. 104–110. With 1 text fig.

Tryparsamide, sodium and potassium tartro-bismuthate, ethyl hydnocarpate, and sodium antimonyl tartrate have been tried for the treatment of hamsters (*Cricetulus griseus*) experimentally infected with leishmania. In no case was a cure obtained, but the average spleen-weight was less in treated than in untreated hamsters.

SERGENT (Edm. & Et.), PARROT (L.), DONATIEN (A.) & BÉGUET (M.). Transmission expérimentale du bouton d'Orient (clou de Biskra) à l'homme par *Phlebotomus papatasi* (Scopoli). [**The Transmission of Oriental Sore to Man by** *Phlebotomus papatasii*].—*Ann. Inst. Pasteur.* 1926. May. Vol. 40. No. 5. pp. 411–430. With 5 text figs.

In this paper are set out at length details of the work done in connexion with the transmission of oriental sore to man by means of *P. papatasii*, a note regarding which was presented to the Académie des Sciences in November, 1921.

The morphology of the parasite both in the lesion and in cultures was that of *L. tropica*, but as certain identification was not possible by these means alone the parasite was used for the inoculation of white mice and dogs.

The virus was first inoculated, at the 6th subculture (age 21 days) into 6 mice intraperitoneally. Five of these died in less than 3½ months without shewing any evidence of infection. The sixth died just over four months after inoculation and was found to be infected.

Five mice inoculated with the 11th subculture (age 21 days) failed to become infected.

Six mice inoculated with the 15th subculture (age 12 days) became infected.

It was also found possible to transmit the infection from mouse to mouse by intratesticular inoculation.

The first attempt to transmit the infection to the dog by intracutaneous inoculation failed. But subsequently five dogs were successfully infected by the intradermal path with material obtained from the testicular lesion of an infected mouse.

PARROT (L.) & DONATIEN (A.) Infection naturelle et infection expérimentale de *Phlebotomus papatasi* (Scop.) par le parasite du bouton d'Orient. [**The Natural and Experimental Infection of** *Phlebotomus papatasii* **with the Parasite of Oriental Sore.**]—*Bull. Soc. Path. Exot.* 1926. Oct. Vol. 19. No. 8. pp. 694–696.

Publication of full details of the work recorded in this short paper is to be made later in the Archives of the Pasteur Institute of Algeria. Examination of 181 female phlebotomi revealed infection with leptomonas in one only. In this fly hundreds of the parasites were present

in the stomach, and these appeared, for the most part, to be attached to the epithelium by their flagella.

Forty-three female flies were given access to a mouse infected with leishmania and 6 were found to be infected. The mouse was infected by intradermal inoculation on the tail with culture. This method of inoculation leads to the development of local lesions in a week or ten days.

The flies had access to the whole surface of the mouse's body, and fed largely upon the nose and ears.

In a second experiment 29 flies were used, and the experiment was so arranged that the flies could reach the tail only. In this instance 11 flies were found to be infected.

The flagellates found in the flies possessed all the characters of cultural forms of *L. tropica.* In the stomach of the fly multiplication takes place very rapidly, and short ovoid forms and slender forms may be found 16 hours after the infecting meal. By the 36th hour parasites are generally numerous in the anterior part of the stomach, where they occur in rosettes. Some show evidence of longitudinal fission.

The living flagellates persist long after digestion of the blood meal has been finished. They have been found up to the 95th hour, and in one case up to 12 hours after the death of the fly, although there was no trace of blood in the stomach or intestine.

In spite of careful examination, the only part of the fly invaded by the flagellates appears to be the alimentary tract from the oesophageal valve to the origin of the malpighian tubes.

PARROT (L.) & LESTOQUARD (F.). Sur quelques détails de la structure des Leishmania. [**Some Structural Details of Leishmania.**] —*Arch. Inst. Pasteur d'Algérie.* 1925. Dec. Vol. 3. No. 4. pp. 327–332. With 2 plates (1 coloured).

The authors state that they have devised techniques of fixing and staining Leishmania, at least *L. tropica,* whereby the existence of an internal flagellum or rhizoplast can be demonstrated in every parasite, and not only exceptionally as is usual with Romanowsky methods. First technique. Fix in Schaudinn's fluid for 10 minutes, and treat with iodized alcohol. Remove the iodine with 95 per cent. alcohol and dry. Cover the specimen with horse serum and leave for ten minutes. Dry rapidly in the air and stain for an hour in 1:10 giemsa. It is to be noted that the sublimate solution should be not less than 24 hours old. The iodized alcohol should be made by adding 2 parts of the official tincture to 98 parts of 95 per cent. alcohol. While almost any sort of serum will do, horse serum gives the best and most constant results. The water used for diluting the giemsa should be exactly neutral, but rather acid than alkaline.

Second technique. Fix in iodized alcohol for 10 minutes. Wash out all traces of iodine with 95 per cent. alcohol and dry.

Cover with horse serum for 10 minutes. Dry rapidly in the air and stain for an hour with Crétin's formula of 10 per cent. trieosinate of methylene. Wash and dry.

The first of these methods is the more complicated of the two, but it gives the better results.

Stained by either method and examined by artificial light the Leishmania shew a pink body with a dark margin. The nucleus is deep

red with a central area (? nucleolus) which is wine red. The centrosome is also wine red and the rhizoplast a reddish pink.

In specimens made from the testicular lesion of experimentally infected white mice the authors have been able to follow the division of the rhizoplast in organisms that are in the process of multiplication.

In the resting state the rhizoplast appears as a straight or curved fibrillar band of a pinkish tinge. It begins close to the middle point of the centrosome and extends outwards to the enveloping membrane, which it reaches at a point which is as a rule close to one of the poles of the parasite. It does not extend outside the parasite, as stated by GONDER. In the process of multiplication the rhizoplast splits longitudinally, beginning at the centrosome end.

The techniques described colour the enveloping membrane, which is still little known, selectively. As the staining affinities of this membrane are identical with those of the rhizoplast, the usual methods of staining do not allow of its detection, but its presence may be suspected from the regularly oval contour of the parasites.

The techniques described show up this envelope as a "veritable pink shell," which is of a paler tint than the rhizoplasts. It is this structure which makes the cytoplasm of the organism appear pink by this method of staining; the cytoplasm in reality is scarcely coloured at all.

In smears made from the lesions of mice or monkeys there are often found, and frequently in abundance, the empty envelopes of the parasite. These may be torn or split like a seed pod. Sometimes in these damaged parasites the centrosome and rhizoplast are still present, the nucleus alone having disappeared. The author believes that these correspond to the forms described by MESNIL, NICOLLE, & REMLINGER as "atypical forms staining uniformly pink and containing only a little mass of chromatin."

KRIJGSMAN (B. T.). De therapie der Coccidiose. Part I. De therapie der koninjnencoccidiose. [**The Therapy of Coccidiosis of the Rabbit.**]—*Tijd. v. Diergeneesk.* 1926. Sept. 15. Vol. 53. No. 18. pp. 817–824, & No. 19. pp. 865–879.

The value of any therapeutic agent can only be determined by experimental means in the laboratory.

A fatal termination of a case of coccidiosis is almost invariably due to lesions of the bowel allowing bacterial invasion to take place.

Creolin is a very valuable remedy in all stages of the disease, and when used in conjunction with proper hygienic measures may render possible the stamping out of the disease.

The creolin used in the experiments contained 25 per cent. cresol, and the animals used were experimentally infected. The dose for a rabbit is 20 cc. of ¼ per cent. solution per kilogramme. This dose given three days in succession produced no evidence of nephritis.

YAKIMOFF (W. L.), GALOUZO (J. G.) & RASTEGAIEFF (E. F.). La coccidiose des porcs en Russie (U.S.S.R.) [**Coccidiosis of Pigs in Russia.**]—*Russian Jl. Trop. Med.* 1926. No. 4. p. 77.

Examination of 40 animals in the Lodeinoé Polé district showed that 12 were infected with coccidia, and in the Wolkhov district 2 were found out of 29 examined.

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Examination of 40 animals in the Lodeinoé Polé district showed that 12 were infected with coccidia, and in the Wolkhov district 2 were found out of 29 examined.

At the Leningrad abattoirs 20 pigs from the Wiatka province were examined, but only one shewed oocysts in the faeces, and of 30 from the Ekatérinoslav province 2 were found infected.

Twenty pigs examined on a Leningrad farm were found to be free from infection.

During a tour in the Transcaucasus faeces of fifty-one pigs from four different places were examined. Only one was found to be infected.

TYZZER (E. E.). *Heterakis vesicularis* **Frölich 1791: a Vector of an Infectious Disease.**—*Proc. Soc. Exp. Biol. & Med.* 1926. May. Vol. 23. No. 8. pp. 708–709.

Blackhead, caused by *Histomonas meleagridis*, is transmitted experimentally and to some extent in nature by direct ingestion of material contaminated with freshly passed discharges containing the protozoon. It appears, however, to be much more frequently transmitted indirectly by some phase distributed on the soil, evidently in association with the eggs of the caecal worm *H. vesicularis*. The presence of the protozoon in the egg of Heterakis is indicated by experimental evidence of various kinds. Heterakis eggs kept in 1·5 per cent. nitric acid until embryonated, in order to render the eggs bacteriologically sterile, produce blackhead in young birds isolated from other sources of infection. That the parasite apart from the egg cannot resist this strength of acid is shown by the fact that excreta from infected birds so treated are not infective. Blackhead will not be produced by feeding with eggs that have not embryonated. Unripe eggs invariably give negative results.

The feeding of male Heterakis furnishes negative results.

Only negative results have been obtained with Heterakis from pheasants and geese.

The presence of the parasite in the egg has not been established, but the invasion of the tissue of the worm by the parasite has been demonstrated in a number of cases in half grown worms from cases of blackhead.

It is not yet known whether the acute disease or the carrier stage is most favourable for the infection of the worm.

HERMITTE (L. C. D.) GUPTA (S. C. S.) & BISWAS (T. N.). **The Therapeutic Value of Stovarsol administered by Mouth in Parasitic Infections of the Bowel, with Special Reference to its rapidly Curative Effect in Human Balantidiosis.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1926. June. Vol. 20. No. 3. pp. 206–212.

The authors give an account of three cases in which stovarsol administered by the mouth caused a rapid disappearance of balantidium. The dose given was 4 grains dissolved in 5½ ounces of water in the morning. The parasites disappeared after the second to the fourth dose.

PATTON (W. S.) & HINDLE (E.). **Notes on Three New Parasites of the Striped Hamster** (*Cricetulus griseus*).—*Proc. Roy. Soc.* 1926. Oct. 1. Ser. B. Vol. 100. No. B 704. pp. 387–390. With 2 text figs.

The authors describe *Trypanosoma cricetuli* n. sp., *Grahamella cricetuli*, n. sp. & *Sarcocystis cricetuli* n. sp.

HANSCHELL (H. M.). **On Supposed Drug-fast Parasites in Syphilis.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1926. June. Vol. 20. No. 3. pp. 213–223.

The author thinks it inadvisable to refer to drug-fastness as an explanation of the failures recorded in cases of syphilis. He points out that the destruction of the parasites is not a direct action of the drug, but that it is probably due to some substance resulting from the interaction of the drug with the host tissues. It is possible therefore that failures in treatment may result from the deficiency of this specific therapeutic agency in the host's tissues. A further possible explanation of failures is the existence of some centre where the parasites are not exposed to or are protected against the action of the drug.

Histories are given of two sets of cases from which the conclusion is drawn that alcohol and fear may be responsible for an inhibition of the power to react on the part of the tissues of the hosts.

An account is given of a case the history of which furnishes evidence that an enlarged inguinal gland formed a centre in which the parasites were protected from drug action.

A further case is described the features of which suggest the existence of syphilis of the central nervous system leading to disease elsewhere in the body. The latter could be cleared up by treatment, but relapse through infection from the central nervous system occurred.

DIOS (R. L.) & ZUCCARINI (J. A.). Primera comprobación de Espiroquetes en la sangre de caballos de la República Argentina. [**The Detection of Spirochaetes in Equine Blood in the Argentine.**]—*Revist. Inst. Bact. Dept. Nac. Hyg.* 1925. Sept. Vol. 4. No. 2. pp. 119–120. With 1 coloured plate.

The occurrence of spirochaetes in the blood of horses showing no clinical symptoms is recorded.

BATTAGLIA (Mario). Degenerazione grassa e necrosi acuta del fegato e del rene da *Trypanosoma brucei*. [**Fatty Degeneration and Acute Necrosis of the Liver caused by** *T. brucei*.]—*Pathologica.* 1926. July 15. Vol. 18. No. 417. pp. 336–337.

DOGIEL (V.). Sur quelques infusoires nouveaux habitant l'estomac du Dromadaire (*Camelus dromedarius*). [**New Infusoria from the Stomach of the Dromedary.**]—*Ann. Parasit. Hum. et. Comp.* 1926. July. Vol. 4. No. 3. pp. 241–271. With 10 text figs.

FABRE (H.) & BERNARD (M.). Trypanosomiase bovine à la Guadeloupe. [**Bovine Trypanosomiassis in Guadeloupe.**]—*Rec. Méd. Vét.* 1926. Aug. 15. Vol. 102. No. 15. pp. 465–467.

This paper has appeared elsewhere and has been abstracted.

FOLEY (H.) & CATANEI (A.). Hémogrégarines de sauriens d'Algérie. [**Haemogregarines of Lizards in Algeria.**]—*Arch. Inst. Pasteur d'Algérie.* 1925. Dec. Vol. 3. No. 4. pp. 344–351. With 4 plates.

HEGNER (R. W.). *Endolimax caviae* n. sp. **from the Guinea-pig and** *Endolimax janisae* **n. sp. from the Domestic Fowl.**—*Jl. of Parasit.* 1926. March. Vol. 12. No. 3. pp. 146–147. With 1 plate.

PETROCHI (J.) & ZUCCARINI (J. A.). Sobre la presencia del *Plasmodium danilewsky* y de *Haemoproteus* sp. en. la sangre de los gorriones (*Passer domesticus*) de Buenos Aires. [**The Presence of** *Plasmodium danilewskyi* **and** *Haemoproteus* **sp. in the Blood of Sparrows at Buenos Aires.**]—*Revist. Inst. Bact. Dep. Nac. Hyg.* 1925. Mar. Vol. 4. No. 1. pp. 57–62. With 1 coloured plate.

DISEASES DUE TO METAZOAN PARASITES.

SCHWARTZ (B.). **Specific Identity of Whipworms from Swine.**—*Jl. Agric. Res.* 1926. Aug. 15. Vol. 33., No. 4. pp. 311–316. With 2 figs.

A morphological comparison of whipworms (Trichuris) from man, the chimpanzee, cercopithecus, and swine, has shown that the worms from these hosts are morphologically indistinguishable as far as they have been compared. SCHNEIDER'S differentiation between whipworms from man and other primates and those occurring in swine has been shown to be due to individual variation.

SANDGROUND (J. A.). **Biological Studies on the Life-Cycle in the Genus *Strongyloides* Grassi 1879.**—*Amer. Jl. Hyg.* 1926. May. Vol. 6 No. 3. pp. 337–388. With 1 plate & 2 text figs.

A review of the literature shews that nothing is definitely known as to the causes of the alternative methods of development occurring in a number of species belonging to this genus. The theories put forward by earlier workers are found to be inadmissible.

The examination of small faecal cultures is unreliable. When BAERMANN'S technique is used with larger cultures both modes of development are found to exist together.

By following infections over a considerable time, the quantitative relationship between direct and indirect development is found to be subject to constant changes. Infection in some abnormal hosts lead to changes in life cycle.

The parasitic female strongyloides is at present held to be parthenogenetic, but there are indications that it is really hermaphroditic.

LEWIS (E. A.). **Starlings as Distributors of "Gapes."**—*Jl. Helminth.* 1926. May. Vol. 4. No. 2. pp. 43–48.

During November, 1925, to February, 1926, examination of 482 starlings shewed 35 per cent. to be infested. Starlings, turkeys, and pheasants carry over the parasite from one chick season to the next.

CAMERON (T. W. M.). **On the Morphology of the Adults and the Free Living Larvae of *Dictyocaulus arnfieldi*, the Lung-worm of Equines.**—*Jl. Helminth.* 1926. May. Vol. 4. No. 2. pp. 61–68. With 2 figs.

Basing his work on living specimens from the lungs of a donkey, the author describes the adult worms, and the free living larvae. For details the original paper must be consulted, but it may be stated that the females range from 43 to 60 mm. in length and are 0·4 mm. thick. The males measure 25 to 35 mm. by 0·25 mm.

The eggs are almost round and measure 0·09 mm. and contain living embryos when deposited. In water at 20° C the eggs hatch within a few hours, yielding first stage larvae, which measure 0·43 mm. by 0·015 mm.

The larva completes its first moult within 24 hours of hatching, but does not escape from the old cuticle until after the second moult has been completed. The second stage is rather smaller than the first, as it still remains in the old cuticle.

The second stage lasts 12 to 24 hours, and normally the double cuticle can be seen. At a variable period after reaching the third stage the larvae generally escapes from the first cast cuticle, but in no case was one seen to lose the cuticle of the second stage, As material was scanty little experimental work could be done. It was found, however, that larvae were able to survive for two days at temperature just above freezing point. Desiccation was found to be fatal to larvae. No evidence of skin penetration or migration was obtained. The larvae could not be kept alive in water beyond a fortnight.

AYNAUD (M.). Présence de larves de Nématodes dans les tumeurs du charbon symptomatique et du Bradsot. [**Larval Nematodes in Black-leg and Bradsot "Tumours."**]—*Compt. Rend. Soc. Biol.* 1926. July 16. Vol. 95. No. 25. pp. 440–441.

The author suggests that Black-leg and Bradsot may be caused by worms, because in sections from a muscle tumour from a heifer (one of a herd affected with parasitic bronchitis) and in 3 cases of Bradsot strongyles were found in the contents of the abomasum and larvae were found in the wall of the organ.

DIOS (R. L.) & ZUCCARINI (J. A.). Microfilaire du sang des chevaux. [**Microfilariae in the Blood of Horses.**]—*Compt. Rend. Soc. Biol.* 1926. Sept. 21. Vol. 95. No. 27. p. 827.

The authors record the occurrence of microfilairae in the blood of a horse at Buenos Aires. The parasites were found in blood from the jugular, but not from the ear. Inoculation of another horse with 80 cc. of blood subcutaneously and with 20 cc. intravenously apparently failed to cause infection.

ROSSI (P.). Contribution à l'étude du Phlébotome en Aunis. [**Phlebotomus in Aunis.**]—*Bull. Soc. Path. Exot.* 1926. Oct. Vol. 19. No. 8. pp. 705–709.

This paper contains an account of observations regarding the occurrence of Phlebotomus at La Rochelle.

NITZULESCU (V.). Sur la constitution du canal alimentaire chez les phlébotomes. [**The Alimentary Canal of Phlebotomus.**]—*Bull. Soc. Path. Exot.* 1926. Oct. Vol. 19. No. 8. pp. 709–714. With 5 text figs.

The author disagrees with the description of the piercing apparatus given by CHRISTOPHERS, SHORTT & BARRAUD.

SMITH (R. O. A.). **A Simple Method for the Staining and Mounting of Sandflies.**—*Indian Jl. Med. Res.* 1926. July. Vol. 14. No. 1. pp. 171–172. With 1 plate.

Certain details such as the nature of the hairs on the abdomen, the colour, and the presence or absence of scales are recorded before the fly is mounted, as the method removes the hairs.

Dead flies are placed in 10 per cent. caustic potash over night. They are then placed in pure liquid carbolic acid containing 1 cc. of saturated alcoholic eosin to 7 or 8 cc. The tube containing the flies in this liquid is heated in a water bath for 15 minutes; the liquid must not boil. The flies are washed in clove oil and mounted in thin Canada balsam or preferably euparal.

CLEVELAND (C. R.). **Repellent Sprays for Flies attacking Dairy Cattle.**—*Jl. Econ. Entomol.* 1926. June. Vol. 19. No. 3. pp. 529–536.

The author records the results of a systematic examination of this question during a period of 2 years and covering nine and ten herds respectively. The formulae of 7 home-made sprays are given.

A uniform method of spraying all cows once a day after morning milking was resorted to, but in some instances there was in addition an evening spraying during part or the whole season.

Figures are given regarding the cost of each for spraying ten cows for 3 months. In most cases, one spraying per day proved to be effective and sufficiently lasting. It is important that sufficient material be used; an excessive quantity was not more effective.

Haematobia irritans L. was the most abundant fly, but *Stomoxys calcitrans* was present in numbers nearly as large. The latter species was more difficult to deal with than the former, which was readily repelled.

While all the sprays tested were of some value, from the general point of view, economy, ease of preparation, effectiveness, etc., it was thought that one containing used crank case oil 1 gallon, oil of tar 1 pint, was the best.

LAAKE (E. W.), PARMAN (D. C.), BISHOPP (F. C.) & ROARK (R. C.). **Field Tests with Repellents for the Screw Worm Fly,** *Cochliomyia macellaria* **Fab., upon Domestic Animals.**—*Jl. Econ. Entomol.* 1926. June. Vol. 19. No. 3. pp. 536–539.

This paper contains a summary of the work done during the summers 1924 and 1925 in Texas. 332 goats, 78 sheep, 115 cattle, 28 horses, 5 hogs, and 6 dogs were used in the tests.

The method of treatment was as follows: Benzol was poured over the eggs and larvae and in the wounds of infested animals. The dead larvae and eggs were then removed and the area swabbed over with the repellent. The treated animals were all kept under conditions rendering regular observation and examination easy.

In view of the great variation in size, number, and nature of the wounds treated, it was thought inadvisable to judge any dressing by the time taken for the wound to heal. The number of times a wound became re-infected after the first application appeared to afford a better criterion.

Altogether, 18 repellents were tested, but only 11 to an extent warranting any conclusions.

The best results were apparently obtained with Pure Tar Oil 95 vols. Beta-naphthol ethyl ether 5 vols.

PILLERS (A. W. N.) & EVANS (A. M.). **A New Larva of** *Oestrus* (*Gastrophilus*) **from Zebras.**—*Ann. Trop. Med. & Parasit.* 1926. Aug. 13. Vol. 20. No. 3. pp. 263–264. With 1 plate.

Small numbers of the parasite were found, but the authors have no hesitation in confirming the opinion of POTTS, who examined the material in 1925, that it is a new species.

The larvae described is most closely related to *O. veterinus* Clark (*O. nasalis* Brauer), but differs from it in having no spines on the 3rd and 4th segments.

BISHOPP (F. C.), LAAKE (E. W.), BRUNDRETT (H. M.) & WELLS (R.) W.). **The Cattle Grubs or Ox Warbles, their Biologies and Suggestions for Control.**—*U.S.A. Dept. Agric. Department Bull.* No. 1369. April. 1926.

Of the two species *H. bovis* appears to occur further north than *H. lineatum.*

The larvae penetrate the skin at or near the place where the eggs are laid.

H. lineatum prefers the heels as points of attachment for the eggs and it attaches them to the hairs in rows. *H. bovis* deposits its eggs singly on the hairs of the legs and particularly on the thighs and rump. The incubation period is 3 days or a little more.

Larvae begins to appear in the chest and abdomen about 2 months after penetration of the skin.

It appears to be a fact that *H. lineatum* is the only one which spends any time in the submucosa of the gullet. Most of the parasites in this position are 2nd stage larvae.

The passage from the oesophagus to the subcutaneous tissue of the back appears to occupy a short space of time only.

The period spent under the skin of the back ranges from about 5 weeks to 11 weeks ; the shorter period was recorded in Texas and the longer in New York.

Larvae emerge at any time, but the majority come out during the morning.

H. lineatum in Texas required from 18–77 days between emergence and the appearance of the fly. In New York State *H. bovis* required 22–45 days for this stage of development.

The adult flies of both species last only some 5 or 6 days.

The times at which larvae become mature and leave the host are of great importance in the matter of control. Temperature, humidity, cloudiness and drainage are of importance also. No insect enemies or diseases have been found affecting Hypoderma.

The most effective time for control measures is during the period of development in the subcutaneous tissues of the back. Among the most effective materials are : Derris used as a wash, ointment or powder, iodoform or pyrethrum as ointments, benzol and carbon-tetrachloride injected into the grub cysts, fine tobacco powder applied as such, and nicotine dust applied dry.

Experiments with wading baths showed, that no good results were obtained in attempts to attack the parasite in the egg or grub stage. Treatment is deprived of a great deal of its value if untreated animals

are in close proximity. Treatments must be applied at intervals not exceeding 35 days, and the first must be applied before the first larvae have emerged. As a rule it is necessary to give four treatments during the season.

PARMAN (D. C.). **A Brief History of the Stick-tight Flea and the Fowl Tick in the United States.**—*Jl. Econ. Entomol.* 1926. Aug. Vol. 19. No. 4. pp. 644–648.

The object of the paper is to bring to the general notice the losses caused by these parasites and to emphasize the need for concerted action against them. The loss is estimated at hundreds of thousands of dollars annually.

The poultry flea attacks, besides poultry, sparrows, owls, cats, rats, rabbits, goats, dogs, mules, horses, and human beings, and there is reason to believe that it lives on wild hosts also. The attacks of the tick *Argas miniatus* are confined practically to poultry although other hosts have been reported.

The present distribution of the parasites in the United States is not known with certainty, but the tick is known from Florida to California and as far north as Oklahoma.

The established flea infestations extend from S. Carolina to California and north to Kansas and Missouri.

The adult flea spends most of its time upon its hosts. The eggs are laid there, but drop off to the ground. The immature phases will develop or die within 2 or 3 months. Experimentally it was found that without a host the flea probably dies in 6 months. The ticks on the other hand may live for a year or more without a host, and eggs have been found viable after six months.

Under favourable conditions the flea requires 2 to 3 weeks for complete development, the tick not less than 6 weeks.

Fleas usually remain on the hosts for about 2 weeks, but it may be as long as a month. The larval tick remains for about four days, and the adult for a few hours only, and usually at night.

GUYTON (F. E.). **Preliminary Report on Sodium Fluoride as a Control for Cattle Lice.**—*Jl. Econ. Entomol.* 1926. Aug. Vol. 19. No. 4. pp. 602–603.

Sodium fluoride was applied to the neck, shoulders, and rump by means of a small tin shaker, after which it was rubbed into the hair by the naked hand.

After a preliminary trial in a few badly infested animals an entire herd of 86 animals was treated.

The application was made on February 22nd, and on the following day a few living lice were found only on those animals which were most seriously infested. On March 1st a few lice were found on two cows only. One of these died and no lice could be found on the others a week later. A subsequent inspection failed to reveal the presence of any lice.

The species of lice present were:—*Trichodectes scalaris, Haemotopinus eurysternus,* and *Haematopinus vituli.* The dressing required about an ounce for each animal.

SENEVET (G.) & ROSSI (P.). *Ixodes ricinus*, tique des régions froides ou tempérées. [*Ixodes ricinus*. **The Tick of Cold or Temperate Regions.**]—*Bull. Soc. Path. Exot.* 1926. July. Vol. 19. No. 7. pp. 558–560.

The authors have collected together the references regarding the distribution of *Ixodes ricinus*, and they find that with a few minor exceptions no record of its occurrence south of parallel 40 has been made.

The tick therefore, is one of temperate and cold climates. The cycle of development takes place during the part of the year when the temperature is favourable. In the more northern countries this is during the summer, but in the hotter parts of the temperate zone development takes place during the winter.

BISHOPP (F. C.). **The Fowl Tick and how Premises may be freed from it.**— *U.S.A. Dept. Agric. Farmers' Bulletin No.* 1070.

——. **Fleas and their Control.**— *U.S.A. Dept. Agric. Farmers' Bulletin No.* 897.

—— & WOOD (H. P.). **Mites and Lice on Poultry.**— *U.S.A. Dept. Agric. Farmers' Bulletin No.* 801.

CAMERON (T. W. M.). **On the Life History of the Lungworm,** *Synthetocaulus abstrusus*, **hitherto confused with that of** *Ollulanus tricuspis* **in Cats.**— *Jl. Helminthology.* 1926. May. Vol. 4. No. 2. pp. 53–60. With 1 plate.

HOEPPLI (R.). Anatomische Veränderungen des Hundedarms, hervorgerufen durch *Nanophyes salmincola* Chapin. [**The Lesions caused by** *Nanophyes salmincola* **in the Intestine of the Dog.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1926. Sept. 13. Vol. 30. No. 9. pp. 396–399. With 2 text figs.

WETZEL (R.). Strongyliden der Pferde in Deutschland. [**The Strongyles of the Horse in Germany.**] **Part III.**—*Deut. Tierärzt. Woch.* 1926. Oct. 16. Vol. 34. No. 42. pp. 739–744.

WETZEL (R.). Strongyliden der Pferde in Deutschland. [**The Strongyles of Equidae in Germany.**] **Part IV.**—*Deut. Tierärzt. Woch.* 1926. Nov. 20. Vol. 34 No. 47. pp. 817–821.

WURM (H.). Ueber eine Milbenerkrankung der Lunge bei *Macacus rhesus*. [**A Disease of the Lungs of** *Macacus rhesus* **caused by Acari.**]—*Cent. f. Bakt.* I. Abt. Orig. 1926. June 7. Vol. 98. No. 7-8. pp. 514–521. With 6 text figs.

BACTERIAL DISEASES.

ARCHIVES DE L'INSTITUT PASTEUR D'ALGÉRIE. 1925. Dec. Vol. 3. No. 4. pp. 436–438. Immunisation anticharbonneuse des solipèdes par inoculation intradermique des vaccins pastoriens destinés à l'Algérie. Épreuve de l'Immunité. [**Anti-anthrax Immunization of Solipeds by the Intradermic Method with Pasteur Vaccines.**]

Anti-anthrax vaccination of solipeds by the subcutaneous path has been open to two objections. In some cases too severe a reaction has been produced, and in others animals have died of anthrax shortly after immunization.

Nine solipeds (four horses, two mules, and 3 donkeys) have been vaccinated intradermally with $\frac{1}{5}$ cc. of 1st Pasteur vaccine, followed by $\frac{1}{5}$ cc. of second Pasteur vaccine a week later. As the object of the test was to ascertain the degree rather than the duration of the immunity a test inoculation of $\frac{1}{5}$ cc. of a virulent culture was given eighteen days later.

In no case did the first vaccine produce any local reaction, and only one native horse which was anaemic shewed a rise of temperature for three days. The second vaccine produced a nodule ranging in size from a pea to a nut, but no thermal reaction. The test inoculations produced a small amount of oedema locally. A control donkey recovered after developing a local oedema and having a temperature of 39° for a week. Control ox, sheep and guineapig all died.

It is concluded that the method should be widely practised in Algeria.

LUSZTIG (Alexander). Die Wertbestimmung des Milzbrandserums. [**The Titration of Anthrax Serum.**]—*Cent. f. Bakt.* I. Abt. Orig. 1926. June 7. Vol. 98. No. 7/8. pp. 492–501. With 1 text fig.

The author points out that anti-anthrax serum differs from the majority of protective sera in that it is difficult to titrate it satisfactorily by any of the usual methods. Exact estimations can only be made when very exact dosage regulated according to body weight of the test animals is employed. He selects young rats as being the most convenient test animal. The dose given is established by plate counting of colonies.

Graduated doses of serum and a minimal lethal dose of culture are given subcutaneously at the same time on opposite sides of the body. The value of the serum is expressed as the amount which protects rats per gram body-weight.

ROSENTHAL (L.). Sur la production de bactéridies charbonneuses asporogènes par un procédé nouveau. [**A New Method of obtaining Non-sporulating Anthrax Bacilli.**]—*Compt. Rend. Soc. Biol.* 1926. July 16. Vol. 95. No. 25. pp. 445–447.

Success has been achieved by growing the bacillus in filtered broth from previous cultures, whether these were sporebearing or not.

Five different strains have been used, all of which sporulated within 24 hours.

After two or three passages in filtrate from broth cultures (about a fortnight old) non-sporulating cultures are obtained, and these can be plated. Three of the cultures have given this result. This character is firmly impressed. Cultures have been carried on at intervals of 4 or 5 days for 2½ months without spores developing. Passage through the guineapig does not effect any alteration.

Cultures should be transplanted fortnightly or otherwise they may die out, even when kept at room temperature. EISENBERG has stated that laboratory strains of the bacillus contain sporulating and non-sporulating elements. In order to remove all doubt as to the sporulating power of the original cultures used the strains were purified in the manner suggested by EISENBERG.

SCHILLING (S. J.). **Studies on Anthrax Immunity. 1. The Attenuation of *Bacillus anthracis* by means of Sodium Chloride and other Chemicals.**—*Jl. Infect. Dis.* 1926. Apr. Vol. 38. No. 4. pp. 341–353.

The object of the author's investigations was the discovery of a vaccine which had a greater margin of safety than the Pasteur vaccine, which are still the ones most widely used, and which do not invariably have the desired result.

The author has attempted to achieve attenuation without destruction of the antigenic powers of the organism by growing the bacillus on agar slants to which chemicals have been added in different concentrations.

The following were selected for trial :—Sodium chloride to represent a relatively non-toxic neutral salt, potassium ferrocyanide, a neutral salt with a potentially high toxicity for animal cells, copper sulphate, a neutral salt with a relatively high toxicity for plant cells, sulphuric acid, a non-volatile mineral acid, and sodium hydroxide, a non-volatile base.

Various concentrations of the chemicals mentioned were tried, but some were left out of further consideration as they were responsible for changes in the agar, rendering it unsuitable for cultivation tests. Thus sulphuric acid and sulphate of copper produced hydrolysis of the agar in all concentrations, as did sodium hydrate in concentrations of more than 0·15 per cent. On inoculating and incubating the other media it was found that sodium chloride about 5 per cent, and potassium ferrocyanide about 1 per cent. completely inhibited growth.

It was found that the organism became acclimatized to some extent to the media on subcultivation.

Transfers were made weekly.

At the end of 6 weeks tubes of Dunham's peptone solution were inoculated from each of the cultures, incubated, and used for the inoculation of guineapigs.

The results indicated that, while sodium chloride had produced attenuation, neither potassium ferrocyanide nor sodium hydrate had had any such effect. Subsequently, guineapigs were tested with the sodium chloride cultures to ascertain what dosage could be given without ill effect. It was found that a guineapig could stand an entire slant of a nine days old culture. This produced extensive oedema on the abdominal wall, but not fatal anthrax.

In an attempt to test the immunity of guineapigs inoculated with the cultures attenuated by sodium chloride, the guineapigs all died before it came to giving a test inoculation. The author believes that the immunizing doses were given at too short intervals to allow of the establishment of immunity.

It was found possible to immunize rabbits by such cultures, so that they would withstand doses fatal to non-immunized rabbits.

These rabbits received two immunizing doses at 14 days interval.

SCHILLING (S. J.). **Studies on Anthrax Immunity. II. The Immunization of Sheep by means of Anthrax Bacilli attenuated with Sodium Chloride.**—*Jl. Infect. Dis.* 1926. June. Vol. 38. No. 6. pp. 499–505.

The present paper, as indicated by the title, contains an account of experiments in connexion with the immunization of sheep by the same method.

The vaccine was prepared as follows :—The sixth subculture on the sodium chloride medium was transferred to ordinary agar, from that to Dunham's peptone broth, and then to agar again. These details are given as a check on the stability of the characters of the cultures used. The growth obtained was washed off in normal saline and carbolic acid to 0·5 per cent. was added.

Four sheep were injected subcutaneously with doses of 1, 2, 3 and 5 cc. respectively. All developed local lesions, but these were not very marked although they persisted for some days. There was no general reaction.

After an interval of eleven weeks, these sheep and two controls were given a virulent culture. The controls died and the vaccinated sheep recovered after showing marked local and general reactions. [According to the dates given in the table referring to this experiment, the interval was 5 months and not eleven weeks as stated in the text.] In one of the vaccinated animals there was found ten days after the virulent inoculation a small hard swelling at the seat of that operation. Virulent anthrax bacilli were cultivated from it.

NEVODOFF (A. P.). Cuti-vaccination anti-charbonneuse en un temps: sa valeur pratique chez le cheval. [**Single Dose Cuti-Vaccination against Anthrax: its Practical Value in the Horse.**]—*Compt. Rend. Soc. Biol.* 1926. June 25. Vol. 95. No. 22. pp. 154–155.

The author gives details of two experiments in which three horses were vaccinated once by the intracutaneous path and two were used as controls. In both the vaccinated animals survived without showing any illness and the controls died.

Subsequently, 499 horses and 2 camels were vaccinated by the method without accident. Experiments to test the duration of immunity are to be carried out.

Immunity is established seven days after vaccination and possibly earlier.

ROSSI (L.). De la cuti-vaccination du cobaye contre le charbon au moyen du premier vaccin seul. [**Cuti-Vaccination of the Guinea-pig against Anthrax by means of First Vaccine alone.**]—*Compt. Rend. Soc. Biol.* 1926. Nov. 12. Vol. 95. No. 32. pp. 1138–1139.

Guineapigs were injected with $\frac{1}{50}$ cc. and $\frac{1}{4}$ cc. of first vaccine, at an interval of 8 days. One batch was done subcutaneously and one intracutaneously. A fortnight later the whole, with some unvaccinated controls, were given $\frac{1}{20}$ cc. of second vaccine subcutaneously. Those vaccinated intracutaneously survived, while those done subcutaneously and the controls died.

In a second experiment, the test dose was $\frac{1}{5}$ cc. of second vaccine and the result was the same.

In a test with fully virulent anthrax culture, which was capable of killing guineapigs in a dose of 1/100,000 cc., a dose of 1/50,000 cc. proved fatal.

In a fresh experiment the immunization of the guineapigs was pushed further, a third dose of 1 cc. of first vaccine being given a week after the second dose of $\frac{1}{4}$ cc. Twelve days later, a dose of 1/50,000 cc. of virulent broth culture proved fatal for controls, but not for any of the vaccinated animals in either batch. But when the dose of virulent material was raised to 1/10,000 cc. two out of three of the guineapigs vaccinated intracutaneously were the sole survivors.

URBAIN (A.) & ROSSI (L.). Vaccination du cobaye contre le charbon par le liquide d'oedème. [**Vaccination of Guineapigs against Anthrax by means of Inflammatory Exudate.**]—*Compt. Rend. Soc. Biol.* 1926. July 23. Vol. 95. No. 26. pp. 544–545.

It appears to have been generally found that the anthrax inflammatory exudate cannot be used very successfully for the immunization of guineapigs when it is injected intravenously, intraperitoneally, or subcutaneously.

Urbain and Rossi report experiments in which the cutaneous path was used.

The exudate was obtained just before or immediately after death, defibrinated by shaking with glass beads, and sterilized with chloropicrine.

Doses of 1 to 2 cc. were given, and in some cases these were repeated at 10 to 15 days interval. Batches of guineapigs were inoculated intravenously, intraperitonealy, subcutaneously and cutaneously.

Intravenously, whether one or two doses were given, the liquid produced no immunity. By subcutaneous injection, if two doses were given, fifty per cent. of guineapigs acquired immunity, and similar results followed double intraperitoneal inoculation. Two intracutaneous injections or two applications of swabs soaked in the exudate conferred immunity on all the animals so treated.

Two doses were found to be necessary, and the interval was 10–15 days. The immunity developed slowly and was established 12 to 15 days after the second injection.

UCHIDA (Y.). Experimentelle Infektionen von Mäusen und Meerschweinchen parenteral und von den natürlichen Eingangspforten aus. II. u. III. Mitteilungen. [**The Experimental Infection of Mice and Guineapigs by way of the Tissues and by Natural Paths.**]—*Zeitschr. f. Hyg. u. Infektionskrankh.* 1926. June. Vol. 106. No. 2. pp. 275–280; 281–307.

As a result of comparative inoculation tests, the details of which are given in a tabular statement, the author comes to the following conclusions.

1. Mice can be infected with anthrax bacilli or spores either by way of the blood stream or by the peritoneal path.

2. Smaller doses suffice for subcutaneous inoculation, provided highly virulent spores are present. If the inoculum is free from spores, the minimal lethal dose is about the same in all three cases.

3. Mice inoculated intravenously or intraperitoneally die more quickly than those done subcutaneously with the same dose. He considers that in mice the vascular system and the peritoneum are more susceptible to anthrax infection than the subcutaneous tissue.

The results recorded in the second paper lead him to conclude that in the case of the guineapig the reverse is the case.

Strains of fowl cholera bacilli and Paratyphoid B bacilli isolated from natural cases of guineapig sepsis were found to infect more readily by way of the peritoneum than by the blood and the skin.

The pneumococcus is not readily conveyed by way of the three paths, while the tubercle bacillus is.

REDKO (S. A.). Le charbon bactéridien chez un ours. [**Anthrax in a Bear.**]—*Bull. Soc. Path. Exot.* 1926. July. Vol. 19. No. 7. pp. 518–519.

The bear was one year and three mouths old; and, so far as the history given states, showed evidence of ill health, dullness and loss of appetite for two days before death occurred.

At the postmortem the subcutaneous vessels were engorged with "nearly liquid" blood. The abdominal cavity contained nearly a litre of clear reddish liquid. There was marked hyperaemia of the mucous membrane of the stomach, which was haemorrhagic. The spleen was not enlarged, and was of a bluish-grey colour. The spleen pulp was reddish-black, and a little thick dark red blood trickled from it. The liver was enlarged, yellowish in tint and friable. There was a small amount of reddish urine in the bladder. The heart was dilated and filled with partially coagulated dark coloured blood. Both epicardium and endocardium shewed ecchymoses. Cultures were obtained, and animals inoculated experimentally died of anthrax.

KATSCHAKHIDZÉ (W. A.). Les oiseaux rapaces et le charbon bactéridien. [**Birds of Prey and Anthrax.**]—*Bull. Soc. Path. Exot.* 1926. July. Vol. 19. No. 7. pp. 519–520.

The author fed an eagle with material containing anthrax bacilli and found that while the bird did not become infected cultures of anthrax could be obtained from its faeces.

MULLER (L.). De l'influence de la température sur l'evolution de l'infection charbonneuse. [**The Influence of Temperature upon the Development of Anthrax.**]—*Compt. Rend. Soc. Biol.* 1926. Oct. 19. Vol. 95. No. 28. pp. 861–863.

It is probable that the fact that the temperature of the skin is lower than that of the internal organs plays a favourable part in the development of anthrax.

Of two guineapigs inoculated with culture, one was kept at room temperature and the other was placed in an incubator the temperature of which oscillated between 34 and 38° C. The first died in 4 days and the second survived until the 11th day. At the postmortem, the latter shewed congestion of the lungs with large numbers of staphylococci, but no enlargement of the spleen. Anthrax bacilli were not recoverable in culture.

The experiment was repeated, the incubator being rigidly maintained at 36° C. In this case the incubated guineapig survived.

In a third test three guineapigs were used. One was placed in a chamber cooled by running water. The second was kept in an incubator at 36° C., and the third was kept at room temperature. The experiment was carried out during the summer, when room temperature did not fall below 24° C., even at night. The incubated guinea pig alone survived.

The experiments were repeated with mice. Seven kept at room temperature died, and 5 out of seven kept in an incubator survived.

The experiment with mice was repeated, but the incubator was run at 39° C. In this case the four incubated guineapigs died of anthrax in 48 hours, while the last of the room-temperature controls died on the 8th day.

The author concludes that the temperature at which the skin is kept may be a factor in the skin immunity.

IIZUKA (A.). **On the Disinfection of Anthrax-Spores with Chloride of Lime.**—*Jl. Jap. Soc. Vet. Sci.* 1926. Sept. Vol. 5. No. 3. pp. 183–192.

The author has carried out experiments with solutions of chlorinated lime in well water with the addition of various acids and salts.

No details are given of the exact method of carrying out the tests, but in each case anthrax spores were used. As the author is writing in a foreign language, it is difficult to follow his exact meaning at times.

He finds, however, that the disinfecting power of chloride of lime depends upon the presence of free chlorine. The addition of certain acids—and particularly acetic acid—favours the action. Tartaric and citric acids exercise an inhibitory action. The addition of sodium chloride, alcohol, caustic soda, and sodium carbonate has no influence upon the disinfecting power of the solution. When the materials to be disinfected contain any considerable amount of protein, such as serum, chloride of lime is without disinfecting action. Sodium bicarbonate liberates about 60 per cent. free chlorine from the available chlorine, as does also ammonium carbonate.

ZANOLLI (C.) & SORDELLI (A.). Identidad del Carbunclo Sintomático y de "La Mancha." [**The Identity of Blackleg with "La Mancha."**]—*Revist. Inst. Bact. Dept. Nac. Hyg.* Buenos Aires. 1925. Mar. Vol. 4. No. 1. pp. 40–50.

The authors believe that Blackleg and "La Mancha" are identical. Culturally and microscopically no difference can be detected between the causal organisms. Their pathogenic range is the same, and serological tests fail to disclose any differences. The fact that animals of different ages may contract the two diseases is not held to be of sufficient importance to warrant their being held to be separate entities.

KRAGE (P.). Ueber Myokardveränderungen bei der Haemorrhagischen Septikämie der Kälber. [**Myocardial Lesions in Haemorrhagic Septicaemia of Calves.**]—*Berlin. Tierärzt. Woch.* 1926. Nov. 5. Vol. 42. No. 45. pp. 759–762.

The author's observations were made upon the thoracic viscera of 5 calves which died suddenly. A number of cases of sudden death in calves ranging from 2–5 months had been encountered on different farms in East Prussia, and the only lesion discoverable on post-mortem examination was myocarditis. It was from this outbreak that the author obtained his materials.

In apparently two cases only out of the five was bacteriological examination undertaken. Microscopic examination was negative. By mouse inoculation an organism of the haemorrhagic septicaemia group was recovered. It is noteworthy that in one of the cases mice inoculated with heart blood survived, while those done from the muscular tissue died.

Microscopically, the heart muscle lesions are described as resembling those seen in malignant foot and mouth disease. There is either an acute multiple interstitial myocarditis with primary parenchymatous degeneration, or subendocardial and intramyocardial haematoma. The variations in the severity of the myocardial lesions depend upon variations in virulence of the organisms.

FROHBÖSE (H.). Beitrag zum biochemischen Verhalten der bipolaren Bakterien der hämorrhagischen Septikämie. [**The Biological Features of the Bipolar Bacilli.**]—*Cent. f. Bakt.* I. Abt. Orig. 1926. Oct. 30. Vol. 100. No. 4/6. pp. 213–218.

The author has tested the sugar reactions of 44 strains of avian origin, 3 from rabbits and 3 from cats. He finds that they all ferment dextrose, saccharose, and mannite. Arabinose, rhamnose, lactose, maltose and milk are not changed. All produce indol.

JACOTOT (H.). Sur la vitalité de l'agent du barbone des buffles. [**The Vitality of the Barbone Bacillus.**]—*Compt. Rend. Soc. Biol.* 1926. Oct. 29. Vol. 95. No. 30. pp. 1020–1021.

Suspensions of the bacillus in normal saline will not yield subcultures if the emulsion has been kept at 37°. C. for five hours. In distilled water, the bacillus loses its capacity for growth in 2½ hours. Broth is better than agar for subcultures, and agar made with Martin's broth is superior to plain agar.

Prolonged suspension in salt solution leads to inconstant variations in the morphology of the bacillus.

The addition of yeasts or staphylococci to suspensions renders the bacillus capable of maintaining its viability for longer periods, and also its virulence for the rabbit. Subcultivation of contaminated cultures shows, sometimes with great clearness, a numerically compensative alternation of the organisms present.

On one occasion lysogenic power appeared in an emulsion contaminated with yeast after 20 days at ordinary temperature. This lytic principle disappeared after the second passage.

TANAKA (Asazo). **A Comparative Study of Pasteurella Cultures from Different Animals.**—*Jl. Infect. Dis.* 1926. May. Vol. 38. No. 5. pp. 421–428.

The author has studied 26 strains of organisms of the fowl cholera type. These included 6 from rabbits, 8 from cattle, 2 from sheep, 5 from birds, 4 from pigs and 1 from the buffalo.

They were subject to sugar fermentation tests, the results of which are given in a tabular statement. The results, with a few exceptions, were generally as follows:—All the strains fermented dextrose, galactose, laevulose, mannose, mannite, saccharose, sorbit, and xylose. Maltose was fermented by most of them after 3–5 days. The majority of them also fermented salicin and trehalose. None fermented adonite, dextrin, dulcite, insulin, raffinose, rhamnose and erythrit. All produced indol, and all reduced nitrates.

By colorimetric methods it was ascertained that all cultures reached the maximum in 3 to 4 days.

Antisera were produced from rabbits, but by means of serologic tests (agglutination and complement fixation) no groups of organisms could be distinguished.

FRANCKE (G.) & GOERTTLER (V.). Grundsätzliches zur Rauschbrandfrage. [**Basal Ideas regarding Blackquarter.**]—*Berlin. Tierärzt. Woch.* 1926. Sept. 10. Vol. 42. No. 37. pp. 605–611. With 2 plates.

The authors are of the opinion that it is not possible to distinguish the bacilli of blackquarter and malignant oedema by means of the cultural characters alone. Working along the same lines as ZEISSLER they have been able to get a number of cultural forms which are intermediate between the forms described by him. Special attention is drawn to the necessity of having culture plates in exactly the right condition for getting growth. There must be no trace of condensation moisture. It is admitted that the form of the colonies is valuable, but it is held that it alone is not sufficient for the separation of the organisms. All the cultural characters and the pathogenicity of the organisms must be taken into consideration.

CORDIER (G.) Essais d'immunisation contre le charbon symptomatique. [**Immunization against Blackquarter.**]—*Compt. Rend. Soc. Biol.* 1926. Oct. 19. Vol. 95. No. 28. pp. 848–851.

The author prepares a vaccine in the following way: The heart of an animal which has been inoculated with blackquarter intramuscularly is dropped into Martin's broth, which is covered with a layer of paraffin. After incubation at 37° C., formalin is added in the proportion of 4 or 5 per thousand. Incubation is continued for 24 hours and then the product is tubed. No information is given regarding the duration of the first incubation, or the exact manner of treating the liquid before putting it into phials. Of this vaccine 0·5 cc. is sufficient to protect a guineapig against a virulent inoculation after an interval ranging from 10 to 27 days. The dose of virulent material is obtained by mashing up the heart (apparently of an animal experimentally infected) in salt solution, using 1 cc. of the liquid per gramme.

The method was tried on 9 bovines of different weights and ages, which received doses of 1 to 2 cc. of the formolized vaccine. The test inoculation was 0·25 cc. of heart muscle mash. None of the animals became infected, while a control died.

LECLAINCHE & VALLÉE. Sur l'obtention du sérum contre le charbon symptomatique. [**The Preparation of Anti-Blackleg Serum.**]—*Rev. Gen. Méd. Vet.* 1926. Sept. 15. Vol. 35. No. 417. pp. 481–484.

This brief paper conveys the information that the authors are preparing anti-blackleg serum from bovines instead of from horses as hitherto. The hyperimmunization is carried out with formolized whole culture.

BALOZET (L.) Diagnostic expérimental du charbon symptomatique par culture de la moelle osseuse. [**The Diagnosis of Blackquarter by Culture using the Bone Marrow.**]—*Bull. Soc. Path. Exot.* 1926. July. Vol. 19. No. 7. pp. 515–518.

The author has been able to obtain cultures of the bacillus from the bone marrow of all experimental and natural cases of the disease in which the method has been employed. It is important (particularly in a hot country) that the bone should be taken as soon after death as possible, and the author recommends the metacarpal or the metatarsal. A large amount of seed material should be used, and the media to be preferred are peptone liver broth or Hibler's medium, with a layer of paraffin on them.

BALOZET (L.). Isolement de *Clostridium chauvoei* par culture de moelle osseuse. [**The Isolation of** *Clostridium chauvoei* **by Culture from Bone Marrow.**]—*Compt. Rend. Soc. Biol.* 1926. July 2. Vol. 95. No. 23. pp. 295–296.

Bone marrow can be used for obtaining pure cultures provided the following conditions are fulfilled.

The metatarsus or metacarpus should be selected, and it should be obtained as soon after death as possible. If all the soft tissue is removed immediately, the bone may be kept for some days without the marrow becoming contaminated. A fair amount of marrow must be used as seed material. Liver peptone broth under paraffin (with or without a piece of meat), or Hibler's medium must be used.

MATHEWS (F. P.). **Obscured Reactions in the Agglutination Test for Bacillary White Diarrhea.**—*Jl. Immunol.* 1926. June. Vol. 11. No. 6. pp. 499–504. With 1 text fig.

In carrying out agglutination tests for bacillary white diarrhoea difficulty is sometimes experienced in reading the results owing to the formation of a precipitate, which may settle out, remain in suspension, or collect at the top of the liquid.

The exact cause of this is not yet known, but it appears to be associated with the drawing of the samples of blood from birds that are being richly fed. A period of starvation tends to reduce the liability to the formation of the precipitate. The author finds that a fast of 48 hours is required before appreciable results are obtained. This is impracticable. It was found that the addition of 2 cc. of 2 per cent. sodium hydrate to 100 cc. of antigen prevented precipitation in 95 per cent. of cases, and thus rendered reading of the results possible.

RAMON (G.) & DESCOMBEY (P.). Sur l'appréciation de la valeur antigène de la toxine et de l'anatoxine tétaniques par la méthode de floculation. [**The Estimation of the Antigenic Powers of Tetanus Toxin and Anatoxin by Flocculation.**]—*Compt. Rend. Soc. Biol.* 1926. July 16. Vol. 95. No. 25. pp. 434–436.

Since anatoxin is non-toxic its antigenic power cannot be evaluated in terms of toxicity, but its antigenic power requires some means of standardization. This can be achieved by the flocculation technique.

MacConkey (A. T.). **On Tetanus in the Horse subsequent to Prophylactic Immunization; with Observations on Re-vaccination.**—*Brit. Jl. Exp. Path.* 1926. June. Vol. 7. No. 3. pp. 133–140.

The horse is so very susceptible to tetanus that it is difficult to avoid occasional cases in a stud at a serum laboratory. The risk may be minimized by (*a*) the regular injection of doses of tetanus antitoxin or (*b*) active immunization with a series of doses of toxin guarded by a few doses of antitoxin. The occurrence of tetanus in horses treated in the latter way has raised doubts as to its effectiveness. Four horses received 1,500 U.S.A. units of tetanus antitoxin followed by 150,000 M.L.D. of toxin (for guineapig) subcutaneously. The doses of toxin were spread over 9 days and given in increasing amounts.

Two of these were bled out one and two months later. One was used for other sera for 4½ years and shewed no evidence of tetanus. Three years after dosing its blood did not contain 1/100 unit of antitoxin per cubic centimetre.

The fourth animal received a last dose of an immunization on October 7, 1924, and was bled for serum on October 14. Ten cubic centimetres of serum of this bleeding did not produce the slightest evidence of tetanus in a guineapig. On October 21st there was evidence of tetanus. 16,000 units of antitoxin were given intravenously. The animal showed little sign of illness, except that it appeared to be fatigued until the 5th day, when it was found stretched at full length and showed occasional spasms.

A further 5,000 units of antitoxin were given. Two days later the animal was much worse and was shot. It is suggested that had more antitoxin been given the animal would have been saved, but it was thought that when the disease had been checked the animal's own antitoxin producing mechanism would have come sufficiently into play, it having been immunized by toxin at the beginning.

From tests made with the serum of this animal, at times it would appear that the antitoxin content fell very rapidly during the two months before death, when there was less than 1/100 antitoxic unit per cc. It would appear that 1/100 unit is the limit of safety for the animal. Comparing the facts of the case with those reported by Mohler and Eichhorn, who found that 700 U.S.A. units given 96 hours after infection was enough to ward off an attack of tetanus, it would appear 16,000 units were not sufficient to prevent infection, which must have been in existence less than a week since the serum of a bleeding a week before caused no symptoms in a guineapig. This emphasizes the necessity of giving antitoxin early. Another horse was given 1,500 U.S.A. units of tetanus antitoxin intramuscularly and this was followed by 390,000 M.L.D.'s of toxin distributed over 18 days. At the time the penultimate dose of 100,000 M.L.D.'s was given, 2,000 U.S.A. units of antitoxin were given intramuscularly.

About ten months later this horse was given a dose of scorpion venom and ten days later symptoms of tetanus were noticed. 20,000 U.S.A. units of antitoxin were given at once intravenously, and a further 20,000 on the following day. The symptoms appeared to be passing off and the animal was feeding well, when on the fifth day after the second dose he dropped dead from internal haemorrhage. Examination of sera of a number of horses at different periods

after prophylactic immunization showed that they varied in their response to prophylactic treatment as much as they do to the more prolonged immunization necessary for the production of therapeutic sera and that a certain dose of toxin cannot be relied upon to produce a certain antitoxin immunity. An increase in the amount of toxin does not necessarily cause an increase in the amount of antitoxin produced.

A further point is the possibility, as suggested by the work of TENBROECK and BAUER, that an antitoxic immunity may not necessarily protect against infection. Animals that have recovered from severe generalized tetanus show practically no antitoxin in their blood, but are immune to the type of organism which produced the original infection. It might be suggested that the horses were infected with a type of tetanus bacillus other than that against the toxin of which they were immunized. This is contraindicated by the fact that more than 8 strains of bacilli are always used for the preparation of the toxin for immunizing purposes.

It appears to be clear that the limit of antitoxin immunity is about 3½ years, and consequently revaccination should be practiced every 3 or 4 years.

Details are given of the process of re-immunizing two horses and the tests of their serum at intervals during the process.

The first animal's serum contained less than 1/100 antitoxin unit per cc. The process of re-immunization was therefore begun with 1,500 U.S.A. units of antitoxin intramuscularly; it then received on alternate days 15,000, 25,000 and 40,000 M.L.D.'s (for guineapigs) of toxin. By this time the serum contained 1/50 antitoxin unit per cc. Then a further 1,500 antitoxin units were given intramuscularly, and these were followed on alternate days by 40,000, 70,000, and 100,000 M.L.D. of toxin. At this stage the serum contained more than 3 but less than 5 units per cc.

The toxin injections were continued with 100,000, 150,000, and 250,000 M.L.D., after which the antitoxin content of the serum was more than 10 but less than 20 units per cc. The second animal had, at the time of re-vaccination, 10 units per cc.; antitoxin was therefore not injected and doses of 15,000, 25,000 and 40,000 M.L.D. were given with intervals of two days later. On the fourth day after the last dose the antitoxin content was between 30 and 50 units per cc.

ROZNATOVSKY (J. P.). La fièvre ondulante dans le Caucase du Nord. [**Undulant Fever in the Northern Caucasus.**]—*Rapport. Soc. Méd. Rostov et Séance Conjointe Cons. San. et Epidém. et Assoc. Inst. pour recherches scientif.* 1926. Ex. *Bull. Inst. Pasteur.* 1926. Aug. 31. Vol. 24. No. 16. pp. 723–724.

Undulant fever was first recognised in Northern Caucasus in 1925, when the organism was isolated from the blood and urine of a case.

Forty-five persons in the same village were tested and 19 gave reactions of varying strength.

The sera of 4 goats out of 8, 2 sheep out of 3, and 2 horses out of 3 also gave positive reactions.

TAPIA (M.) & DE NICOLAS (M.). Sur la différentiation du *Micrococcus melitensis* et du *Bacillus abortus* par l'agglutination. [**The Differentiation of** *Micrococcus melitensis* **and** *Bacillus abortus* **by means of Agglutination Tests.**]—*Compt. Rend. Soc. Biol.* 1926. July 23. Vol. 95. No. 26. pp. 563–565.

Using a number of sera from different species of animals inoculated with the two organisms, the authors have carried out agglutination tests, but have not been able to discover any differences of importance.

MAGOON (C. A.). **Studies upon Bacterial Spores. 2. Increasing Resistance to Heat through Selection.**—*Jl. Infect. Dis.* 1926. May. Vol. 38. No. 5. pp. 429–439. With 1 chart in text.

Working with the *Bacillus mycoides*, the author has found that some bacterial spores derived from resistant survivors in thermal death time tests possess higher resistance to heat than the original spores. By a process of selection a strain of bacteria may be obtained whose spores attain a resistance of at least 25 times that of the original spores.

CARBONELL (M. V.) & MAYER (E.). Nueva técnica para la preparación de vacunas bacterianas. [**A New Technique for the Preparation of Bacterial Vaccines.**]—*Revist. Inst. Bact. Dept. Nac. Hyg.* Buenos Aires. 1925. May. Vol. 4. No. 1. pp. 35–39. With 1 text fig.

The authors method for killing bacteria is to pass ether vapour at 42° C into the bacterial emulsion kept at the same temperature. It is claimed to be superior to simple shaking with ether and to be more rapid.

CHRISTIANSEN (M.). *Bacterium abortus* als Ursache der nekrotisierenden Orchitis (orchitis mortificans) beim Stier. [*Bacillus abortus* **as a Cause of Necrotic Orchitis in a Bull.**]—*Maan. f. Dyrl.* 1926. Vol. 37. p. 545. Ex. *Bull. Inst. Pasteur.* 1926. Aug. 31. Vol. 24. No. 16. p. 726.

MAGNUSSON (H.). Ein Fall von Abortusinfektion beim Stier. [**Abortion Infection in a Bull.**]—*Shand. Veter. Tdsk.* 1925. Dec. Ex. *Bull. Inst. Pasteur.* 1926. Aug. 31. Vol. 24. No. 16. pp. 726–727.

MESSIERI (A.). Sul rapporti etiologici fra aborto epizootico da bacillo di Bang e febbre di Malta. [**The Etiological Relationship of Bang's Bacillus with the** *Micrococcus Melitensis.*]—*La Nuova Veterinaria.* 1926. Aug. 16. Vol. 4. No. 8. pp. 201–205.

OHLSSON (L.). Veränderung des Hodens beim Stier, verursacht durch Infektion mit Bang's Abortusbazillen. [**Lesions in the Testicle of a Bull caused by the Abortion Bacillus.**]—*Skand. Veter. Tdsk.* 1926. Feb. p. 25. Ex. *Bull. Inst. Pasteur.* 1926. Aug. 31. Vol. 24. No. 16. p. 727.

RUPPERT (F.) & ROTTGARDT (A.). Rauschbrand und kein Pararauschbrand. [**Black Quarter and no Para-Black Quarter.**]—*Deut. Tierärzt. Woch.* 1926. Aug. 21. Vol. 34. No. 34. pp. 603–606.

DISEASES DUE TO FILTERABLE VIRUSES.

BELIN (M.). Base scientifique d'une méthode de vaccination antiaphteuse. [**Vaccination against Foot and Mouth Disease.**]—*Rec. Méd. Vét.* 1926. July 30. Vol. 102. No. 14. pp. 307–311.

The desiderata of an efficient vaccine against foot and mouth disease, are (1) that it can be obtained in large amounts, (2) that it is living but attenuated, it being possible to ascertain the degree of the latter, (3) it should retain its vitality and virulence for a sufficient length of time, (4) it must be easily applied in practice. So far no vaccine devised has satisfied these conditions.

During the last three years the author has been working upon the simultaneous cultivation of two dermotropic viruses—the foot and mouth disease virus and the vaccine virus. By this means he claims to have produced a vaccine which satisfies all the above conditions.

The simultaneous inoculation of an animal with vaccine virus and the virus of foot and mouth disease at two different parts of the body leads to the production of a large amount of "lymph" which is very rich in both of them. The foot and mouth disease virus appears to multiply readily in the lesions produced by the vaccine virus. The animals providing such lymph were killed by bleeding out before the lymph was collected so that there could be no question of the foot and mouth disease virus being present in it as a result of admixture of virulent blood.

It has been found that this simultaneous inoculation when carried on in series leads to a diminution of virulence of the virus of foot and mouth disease, as shown by inoculation with controls.

If the lymph is collected at the moment when the temperature is at its maximum, however, the virus is not found to be attenuated, but may even be of exalted virulence. To obtain the attenuated virus it must be collected between the 4th and 6th days, that is to say when the temperature has dropped.

Experiments indicate that the virus in the lymph will retain its vitality and its degree of virulence practically unimpaired for months. In a future publication the author promises to show that the vaccine foot and mouth disease lymph can readily be used for immunization by applying it to scarifications of the skin.

BLANC (G.), MELANIDI (C.) & STYLIANOPOULO (M.). Contribution à l'étude expérimentale des varioles animales. L'encéphalite claveleuse du mouton. [**Sheep Pox Encephalitis.**]—*Compt. Rend. Soc. Biol.* 1926. Apr. 23. Vol. 94. No. 13. pp. 959–960.

It has been shown by a number of investigators that intracranial inoculation of the rabbit with "vaccine" causes a distinct vaccinal encephalitis, and that inoculation in any part of the body also sets up a more or less benign encephalitis. The vaccinal virus can be recovered from the brain.

It appeared to be of interest to ascertain whether ordinary subcutaneous inoculation with sheep-pox produced an analogous condition. It is known that the virus of sheep-pox inoculated intracranially will cause severe and even fatal encephalitis. Two sheep giving reaction to

sheep-pox inoculation were killed and emulsions of brain substance inoculated subcutaneously into fresh animals. Typical reactions occurred.

BLANC (Georges), MELANIDI (C.) & STYLIANOPOULO (M.). Contribution à l'étude expérimentale des varioles animales. La réceptivité du cheval au virus claveleux. [**The Susceptibility of the Horse to Sheep-pox.**]—*Compt. Rend. Soc. Biol.* 1926. June 25. Vol. 95. No. 22. pp. 156–157.

This brief note contains a summary of the authors' experiments designed to test the transmissibility of sheep-pox to horses.

They have inoculated the animals subcutaneously, intracutaneously, and into the mucous membranes of the nose and mouth. Only by the second of these methods has any success been achieved. In these cases, an oedematous area measuring 20 by 5 or 6 centimetres developed. Some of the tissue from such a swelling was used for the inoculation of a lamb and infection occurred. Subsequently the lamb was found to be immune. No evidence of bacterial contamination could be found in the material from the horse or the lamb. The infection therefore was specific and pure.

BLANC (G.), MELANIDI (C.) & STYLIANOPOULO (M.). Contribution à l'étude des varioles animales. Variole des chèvres et stomatite pustuleuse. [**Variola of Goats and Pustular Stomatitis.**]—*Compt. Rend. Soc. Biol.* 1926. July 2. Vol. 95. No. 23. pp. 259–260.

In this brief paper the authors summarize the results of observations and experiments which lead them to conclude that caprine variola and pustular stomatitis are two separate and distinct conditions.

The virus of goat variola is not transmissible to the rabbit, dog, fowl, or man. It causes a slight infection in the sheep. It does not immunize against variola, nor does the reverse action take place. The authors have succeeded in infecting a goat three times with variola.

BRIDRÉ (J.) DONATIEN (A.) & LESTOQUARD (F.). De la Virulence de certains tissus chez les Moutons producteurs de virus claveleux. [**The Virulence of certain Tissues of Sheep-pox Virus Producers.**]—*Compt. Rend. Soc. Biol.* 1926. July 23. Vol. 95. No. 26. pp. 533–534.

According to BLANC, MELANIDI, and STYLIANIPOULO, the brain of sheep inoculated subcutaneously with sheep-pox contains the virus. The authors of this paper quote experiments to show that in all probability this virulence was in reality due to the blood contained in the nerve tissue used for the inoculation.

BRIDRÉ (J.) DONATIEN (A.) & LESTOQUARD (F.). Observations sur le virus claveleux. [**Observations on the Virus of Sheep-pox.**]—*Rec. Méd. Vét.* 1926. July 30. Vol. 102. No. 14. pp. 323–326.

It is quite well known that the virus varies in virulence under natural conditions. In countries where it is enzootic outbreaks may be so

benign in character that they may escape notice, while outbreaks occurring in countries where it does not commonly occur may be responsible for serious losses. Experimentally the authors have found that for some unexplained reason the virus may suddenly lose virulence. This occurred in one instance after 600 passages without any apparent change during their course. It is not to be concluded that such attenuation is permanent, but it is not known under what conditions it may regain its former virulence.

The authors criticise experiments published by BLANC, MELANIDI, and STYLIANOPOULO, from which the conclusion was drawn, that even when there is only a very slight local reaction to inoculation with virus, the central nervous system can be proved to contain the virus. They show that it is the blood contained in this system which is infective and not the nerve tissue itself.

SAITO (T.). Vergleichende Untersuchungen ueber Hühner- und Taubenpocken. [**Comparative Investigations of Fowl and Pigeon Pox.**]—*Zeitsch. f. Immunitätsf. u. Experim. Therap.* 1926. Oct. 15. Vol. 48. No. 5/6. pp. 451–466. With 5 text figs.

Direct passage of fowl-pox virus to pigeons leads to infection in a proportion of cases only, and the disease is very mild. Such virus when passed through pigeons in series becomes more virulent for the pigeon. There is simultaneous loss of virulence for the fowl.

Pigeon-pox virus readily infects fowls, but does not produce such marked lesions as in the pigeon. With passage the virus becomes to some extent less virulent for the fowl, while the virulence for the pigeon remains constant.

Either type of virus produces immunity in both species of birds.

CURASSON (G.) & DELPY (L.). Sur l'immunization contre la peste bovine par le virus formolé. [**Immunization against Cattle Plague by means of Formolized Virus.**]—*Rec. Méd. Vét.* 1926. July 30. Vol. 102. No. 14. pp. 297–300.

In the course of their investigations connected with immunization against cattle plague, the authors found that virus killed with carbolic acid, chinosol, and cyanide of mercury yielded no results. The work done in connexion with foot and mouth disease prompted them to try a similar technique for rinderpest. The spleen of a virus producer killed at the height of the thermal reaction when mouth vesicles are beginning to form is minced finely and has added to it normal salt solution containing 0·2 per cent. commercial formalin in the proportion of 5 cc. per gram of spleen pulp. The mixture is kept in the dark at 35–38° C and used after the lapse of at least 40 hours.

In the first test a calf was given " a 100 grammes of spleen " subcutaneously, the dose being divided into three parts and injected at separate places. Abscesses developed at all of these and a slightly foetid pus was evacuated. Eighteen days later this calf and a control were given 5 cc. of virulent blood. The vaccinated calf showed no reaction, while the control developed typical rinderpest.

In the second experiment 50 grammes of spleen were injected. There was neither local nor general reaction. Eleven days later 5 cc. of virus produced no reaction, while the control developed the disease. In subsequent tests the dose of spleen was reduced. A dose of 12 grammes of spleen appeared to afford perfect protection. A calf receiving 5 grammes showed a slight rise of temperature only when tested, and calves receiving 1 and 2 cc. of spleen both developed cattle plague like the control. It is noted, however, that the spleen was 15 days old when these last two animals were injected.

ALIVISATOS (G. P.). Neue Erfahrungen bei der Schutzimpfung gegen Lyssa durch das ätherisierte "Virus fixe." [**Immunization against Rabies by means of Etherized Fixed Virus.**]—*Cent. f. Bakt.* I. Abt. Orig. 1926. May. Vol. 98. No. 5/6. pp. 394–407.

In 1919 and 1920, 424 patients were treated by a modified Högyes method of inoculation, with 8 deaths either during or after treatment. As a result of the careful study of the effects of treatment, the conclusion was arrived at that conditions with regard to rabies in Serbia differ from those in other countries. Rabies is a severe epidemic among dogs, a fact which is no doubt connected with the occurrence of the disease in wolves in the mountainous areas. There is a huge population of stray dogs, and the police regulations are not enforced.

Rabies also occurs in other species of domesticated animals, and a table shows the number of cases encountered in these for the years 1921–1924.

That the street virus is particularly virulent is indicated by the fact that the period of incubation in rabbits inoculated intramuscularly in 60 per cent. of cases ranges from 8 to 15 days. Tabular statements are also given showing that there is good ground for belief that the street virus is particularly virulent for man.

These facts indicate the desirability of devising some means of establishing a high degree of immunity more rapidly than can be done by the Högyes method. The method of preparing the vaccine is as follows: Rabbits which have been infected with fixed virus are killed when death appears likely to take place within a few hours. The entire brain and medulla are removed, freed from meninges and placed in ether. The vessel containing the brain is then left in the ice chest for 72 hours. The cerebral hemispheres are then removed by cutting the crura cerebri above the corpora bigemina. The mid-brain is not used, but the cerebellum has the grey layer shaved off it. The cerebral hemispheres are then separated and the grey matter carefully cut away from the white. The two lots of grey matter are mixed, ground up very finely, and suspended in normal salt solution in the proportion of 1 in 75.

This emulsion is used in cases of persons severely bitten in doses of 150 to 170, or even 200 cc. for subcutaneous inoculation on the abdomen. Where bites do not appear to be dangerous, 30 cc. are given. Where patients have received 100 to 120 cc. at the first injection, the balance up to a total of 170 cc. is given within a week. The observations made appear to indicate that a minimal amount of 60 cc. is necessary to ensure immunity.

VELU (H.), BIGOT (A.) & EYRAUD (R.). Essai de vaccination préventive contre la rage par intervention unique. [**The Single Vaccine Method of immunizing against Rabies.**]—*Compt. Rend. Soc. Biol.* 1926. Apr. 23. Vol. 94. No. 13. pp. 967–968.

Two series of experiments were carried out. 26 dogs were vaccinated with a recently prepared (14 days) vaccine; all received three doses of 2 cc. each. These were divided into four lots (A to D) to be tested respectively at 1, 3, 6, and 12 months interval. The second batch of ten dogs was vaccinated with vaccine from 2–3 months old. These were divided into 2 lots (E & F) and tested at 1 month and 5½ months.

Test inoculations consisted of intraocular inoculation with 0·1 cc. of a 1 to 10 emulsion of virus of different origin. Some were street virus.

There were 3 dogs and one rabbit as control to each lot, and all of these, with one exception, died of rabies. Of lot A four out of 6 were resistant. Five out of 6 died in lot B. Lot C resisted an inoculation, which killed only one control dog out of three. When tested at 10 months with a more active virus, there was only one survivor. In view of the negative results, lot D was not tested. Lot E, one survivor out of 5, lot F, two out of 5.

The results indicate that recently prepared vaccine (Japanese technique) confers a certain amount of immunity, but this lasts for a short time only.

The suggestion is put forward that advantage may possibly be taken of the brief period of immunity to strengthen it by a less attenuated virus.

NAKAMURA (N.) FUTAMURA (H.) & WATAMIKI (T.). **Contributions to Biological Studies on the Virus of Contagious Pleuro-pneumonia of Cattle.**—*Jl. Jap. Soc. Vet. Sci.* 1926. Sept. Vol. 5. No. 3. pp. 194–208. With 1 plate.

The authors have used five strains of virus obtained from different sources in their experiments, of which four were of Japanese original and the other German.

In culture experiments upon solid media, they found that the virus grows more readily under aerobic conditions than under anaerobic conditions, but that in shake cultures the result obtained resembles cultures of Bang's bacillus, the growth developing a little below the surface of the medium. They further found that it was distinctly advantageous to close their culture tubes with rubber stoppers instead of with cotton wool plugs.

Tests made, both with agar and broth containing variable amounts of horse serum and corrected to pH 7·5, shewed that the best growths were obtained when the amount of serum added fell between 10 and 30 per cent.

Broth was prepared from beef, pork, horse flesh and rabbit, but cultural experiments failed to reveal any marked superiority of any one of these. Solid media appeared to require rather less serum (10–15 per cent.) to obtain a maximum growth than liquid media (20–30 per cent.). It is preferable to use fresh serum or serum that has not been heated at a temperature higher than 70° C. A reaction of pH 7·0 to 7·6 was found to be the most favourable. Above and below this little or no growth took place.

The optimum temperature lies between 36° and 38° C. No growth takes place below 27° C.

Fermentation tests were carried out with glucose, mannose, galactose, laevulose, lactose, maltose, saccharose, dextrin, mannite, xylose, arabinose, asparagin, insulin, salicin, isodulcite, and starch. Marked fermentation occurred in glucose, mannose, maltose, dextrin, and starch. There was no formation of indol or sulphuretted hydrogen, and no haemolysis of red corpuscles.

Pleural exudates kept in an ice chest at " 3°–15° C." retained their virulence for six months.

Cultures kept at 37°–38° C. lost their virulence in from 1 to 2 months. At 5°–32° C. virulence was maintained for 2–4 months, and at 3°–15° C. for a little longer. There was, however, a good deal of variation in different cultures, and it was found necessary to transplant cultures once a month in the laboratory.

Cultures heated in water baths were killed in 2 minutes at 60° C., 5 minutes at 55° C., 1 hour at 50° C. and 4 hours at 45° C.

Pieces of porous earthenware soaked in culture were dried and then exposed for different periods to varying temperatures (dry heat). 70° C. proved fatal in 5 minutes, 65° C. in half an hour, 55° C. in 1 hour, 50° C. in 2 hours and 45° C. in 3 hours. 1 in 5,000 perchloride of mercury, 0·1 per cent. " chlorate of lime," 1 per cent. " cresin," lysol, and creolin, exercise a destructive effect upon the virus very rapidly. 0·5 per cent. carbolic acid destroys the virus in 3 hours, and 4 per cent. formalin (Japanese pharmacopeia formalin) in 20 minutes.

DA SILVA (E. P.). Apparition précoce de substances rabicides dans le sang des individus traités par le virus rabique fixe éthérisé. [**The Rapid Appearance of Rabicidal Substances in the Blood of Individuals treated by Etherized Fixed Virus.**]—*Compt. Rend. Soc. Biol.* 1926. July 2. Vol. 95. No. 23. pp. 323–325.

—. Persistance de substances rabicides dans le sang des individus traités par le virus rabique fixe éthérisé. [**The Persistence of Rabicidal Substances in the Blood of Persons treated with Etherized Fixed Virus.**]—*Compt. Rend. Soc. Biol.* 1926. July 2. Vol. 95. No. 23. pp. 326–327.

WESTRING. Versuche und chemische Studie über Behandlung von Maul- und Klauenseuche mit Metallsalzen. [**The Treatment of Foot and Mouth Disease with Metallic Salts.**]—*Berlin. Tierärzt. Woch.* 1926. Nov. 19. Vol. 42. No. 47. pp. 801–802.

MYCOTIC DISEASES.

NAINSOUTA (R.). Action specifique du Biiodure de mercure contre la lymphangite épizootique. [**The Specific Action of Biniodide of Mercury in Epizootic Lymphangitis.**]—*Rec. Méd. Vét.* 1926. Sept. 15. Vol. 102. No. 16. pp. 534–536.

The author has used biniodide of mercury by intravenous injection and claims good results. Two cases were cured in 5 weeks by doses of 2·5 centigrammes in 50 cc. of water, and a very severe case was cured in less than a month by 5 centigrammes daily. [It is not stated for how long these daily injections were given.]

Later he found that 10 centigrammes could be given in 50 cc. of water without ill effect, and two severe cases were cured by 10 injections of this given at two days intervals. [It is not stated how the solution of the biniodide was effected.]

NAINSOUTA (R.). Action spécifique du Biiodure de mercure contre la lymphangite épizootique. [**The Specific Action of Biniodide of Mercury in Epizootic Lymphangitis.**]—*Bull. Soc. Path. Exot.* 1926. Oct. Vol. 19. No. 8. pp. 762–764.

The author advocates intravenous injections of solutions of biniodide of mercury at a strength not exceeding 2 per thousand. It is stated that the drug was dissolved in water; but that would appear to be an error.

Two cases were treated with 2·5 centigrammes dissolved in 50 cc., and this was given "for a week." Complete recovery occurred in 5 weeks.

A dose of 5 cg. per day yielded a complete cure of a severe case in a month. It is not stated how frequently the dose was repeated.

One horse weighing 350 kg. was given 15 daily injections of 10 cg. of biniodide of mercury in 50 cc. of water. No disturbance was observed.

A case occurring in one batch of horses arriving from the Sudan led the author to try the drug as a prophylactic. Each animal was given 5 cg. once a week for three weeks. No further cases developed.

SCHABUROFF (A. N.). Autohämotherapie bei Lymphangitis epizootica [**Autohaemotherapy in Epizootic Lymphangitis.**]—*Berlin. Tierärzt. Woch.* 1926. Oct. 29. Vol. 42, No. 44. p. 739.

Washed red blood corpuscles from diseased animals were injected subcutaneously in doses of 12 to 20 cc. divided between three or four places on the neck, the injections being repeated after 4 to 7 days. Details are given of an animal which had been affected for some time and shewed about 60 abscesses. Autohaemotherapy was applied and the case cleared up in 5 weeks, injections having been given every 5 or 6 days. Six months later there was no evidence of relapse.

In another case, where diagnosis was established by microscopic examination, and glanders excluded by a mallein test, autohaemotherapy was applied at once and recovery took place in 2 weeks.

A month later the animal was still apparently quite healthy.

Two further cases with a similar history are briefly related.

MARTINEZ HERRERA (Clemente). Organización del Servicio Veterinario Regimental, Estadística de los años 1924 y 1925 y Notas sobre la Linfangitis epizóotica y la profilaxis antimuermosa. [**Notes on Epizootic Lymphangitis and the Prevention of Glanders.**]—*Rev. Hig. y San. Pecuarias.* 1926. May–June. Vol. 16. No. 5–6. pp. 285–327. With 25 figs. (2 coloured plates).

This contribution contains an excellent and clearly expressed account of epizootic lymphangitis, its cause, pathology, symptoms and treatment, curative and prophylactic. The symptomatology of the disease is too well known to all veterinarians to need repetition here. The organism, a lemon-shaped body, 3–5 μ in length, 2–4 μ broad, is characteristic. It grows readily on 5 per cent. glucose-Sabouraud at 35°–38° C. The first culture takes 10–12 days, but this is later reduced to 6–8 days, and it will remain alive for three months without subculturing. In young cultures there are at first yeast-like forms,

then long, filamentous, segmented and branching forms with thin walls and finely granular contents with refractile droplets, and, later, chlamydospores develop.

Infection takes place by direct contact, or may be indirectly transferred by brush or curry-comb. Flies gather on an infected wound, but conveyance by insects has not been definitely proved.

Inoculation can be successfully performed in the dog, rabbit, guineapig, fowl and horse. In the last, oedema is at first produced, followed in 15–16 days by small nodules which increase in size, break down, and open on the surface to exude creamy pus, swarming with the Cryptococci. Lymphatics leading from the site become infected and similar nodules appear along the tract. In nature, the disease starts by infection of some wound, and fistulae may form leading to the deeper tissues, bones and ligaments. The period of incubation is probably 7–10 weeks. Diagnosis from sporotrichosis, pustular dermatitis, and such-like conditions is made by microscopic examination of the discharge. The differences between it and glanders are fairly well marked. In glanders the pus is of an oily character, the margins of the ulcers are indurated, though the swellings are soft; the disease is not confined to one lymph-tract, and there is systemic disturbance with fever. In epizootic lymphangitis the pus is creamy, or thin and serous, sometimes yellowish, but never oily; the wound fungates to form an abscess which cicatrizes slowly, the swellings become purulent successively, in most cases only one set of lymphatics is involved, and the mallein reaction is always negative. The disease can be transmitted to man.

As regards treatment, the author has tried intravenous injections of atoxyl, electrargol, biniodide of mercury, colloidal arsenic, salvarsan and its allies, potassium iodide and other drugs recommended, but without benefit. He relies on local measures, extirpation and cautery, opening small abscesses by the thermocautery and washing the wound daily with a concentrated solution of potassium permanganate. Prophylaxis consists in isolation of the infected, frequent inspection of the healthy, and keeping all wounds clean and covered, if possible.

In glanders, prevention of spread can only be ensured by early diagnosis, by the use of mallein, and killing off all the sick; palliative measures are unsafe.*

MISCELLANEOUS.

SULDEY (E. W.). Méthode de Coloration rapide pour recherches hématologique. [**A Rapid Method of Staining Blood Films.**]—*Bull. Soc. Path. Exot.* 1926. Oct. Vol. 19. No. 8. pp. 723–724.

The staining solution used is:—

1 per cent. watery solution of Toluidine Blue	10 cc.
Neutral distilled water	40 cc.
95 per cent. alcohol	10–15 cc.

The stain is applied to dry but unfixed films. One or two drops are placed on the film and drained off, and this is repeated a second time.

* Summarized by Dr. H. Harold Scott.

The film is then carefully blotted with filter paper and examined with the oil immersion. By this means the haemoglobin is removed, but the corpuscles are not otherwise altered. The blood corpuscles and any parasites that may be present are well stained.

YAKIMOFF (W. L.) & RASTEGAÏEFF (E. F.). Sur la question des leucocytes des chameaux. [**The Leucocytes of Camels.**]—*Bull. Soc. Path. Exot.* 1926. July. Vol. 19. No. 7. pp. 582–583.

The authors, as the result of the examination of blood smears from 39 camels, found that the leucocyte formula was liable to variation, and that the smears could be divided into three classes on this basis. Thirty of the smears fell into one group. These were obtained from animals of all ages :

Lymphocytes	21–35 per cent.
Large mononuclears	0–2 per cent.
Transition forms	0–4·3 per cent.
Polynuclears	61·3–78 per cent.
Eosinophiles	0
Mast cells	0

In the second group, which contained the blood smears of 6 animals the following formula was found.

Lymphocytes	10·6–19·6 per cent.
Large mononuclears	0–1·3 per cent.
Transition forms	0–2·3 per cent.
Polynuclears	78·6–89·3 per cent.
Eosinophiles	0
Mast cells	0

The third group of three gave the following formula :—

Lymphocytes	38·3–57·3 per cent.
Large mononuclears	0–·66 per cent.
Transition forms	0–1 per cent.
Polynuclears	41·6–61·3 per cent.
Eosinophiles	0
Mast cells	0

No explanation of the variation is offered.

DONATIEN (A.) & LESTOQUARD (F.). Etiologie des anémies du Mouton et de la Chèvre. [**The Etiology of the Anaemias of the Sheep and the Goat.**]—*Rev. Vet.* 1926. Oct. Vol. 78. No. 10. pp. 597–609.

The authors summarize our knowledge regarding anaemia in sheep and goats caused by animal parasites, protozoa invading the blood, bacteria, and the virus of pernicious ovine anaemia.

BULL (L. B.) & MACINDOE (R. H. F.). **Photosensitisation in Sheep : Trefoil Dermatitis.**—*Jl. Austral. Vet. Assoc.* 1926. Sept. Vol. 2. No. 3. pp. 85–91.

The authors relate circumstances which appear to suggest that the ingestion of *Medicago denticulata* may produce photosensitization of the skin of sheep. There appeared to be a period of latency in the development of the dermatitis.

FOLEY (H.) & MUSSO (L.). Les plantes du Sahara toxiques pour les animaux. Présence d'un glucoside cyanhydrique dans le *Lotus jolyi* Battandier. [**The Toxic Plants of the Sahara. The Presence of a Glucoside in *Lotus jolyi* Battandier.**]—*Arch. Inst. Pasteur d'Algérie.* 1925. Dec. Vol. 3. No. 4. pp. 394–400.

MUSSO (L.). Sur l'emploi des papiers réactifs pour déceler sur place la présence de l'acide cyanhydrique dans les végétaux. [**Test Papers for the Detection of Hydrocyanic Acid in Plants.**]—*Arch. Inst. Pasteur d'Algérie.* 1925. Dec. Vol. 3. No. 4. pp. 401–404.

REVIEWS AND NOTICES.

CAMERON (Thomas W. M.) [M.A., B.Sc. Ph.D., M.R.C.V.S., London School of Hygiene & Trop. Med.] **Diseases of Animals in relation to Man.**—222 pp. With 13 figs. The Modern Health Books. Edited by Prof. D. Fraser Harris, M.D. 1926. London: Faber & Gwyer, Ltd. (The Scientific Press). [3s 6d.]

A review of this book appeared in the *Bulletin of Hygiene*, 1926, Dec., Vol. 1, p. 1011. It should be stated however that the Editor of the *Tropical Veterinary Bulletin* dissociates himself from the view there expressed.

A. G. B.